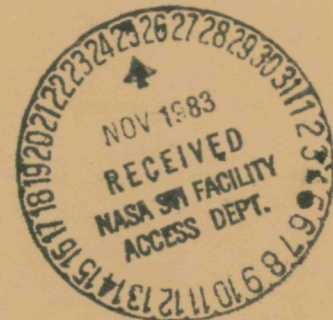


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Aerospace Medicine  
and Biology  
A Continuing  
Bibliography  
with Indexes

NASA SP-7011(250)  
October 1983



25th Anniversary  
1958-1983

# Aerospace Medicine & Biology

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INDEXES (SUPPLEMENT 250) (National  
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# **AEROSPACE MEDICINE AND BIOLOGY**

## **A CONTINUING BIBLIOGRAPHY WITH INDEXES**

**(Supplement 250)**

A selection of annotated references to unclassified reports and journal articles that were introduced into the NASA scientific and technical information system and announced in September 1983 in

- *Scientific and Technical Aerospace Reports (STAR)*
- *International Aerospace Abstracts (IAA).*

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# INTRODUCTION

This Supplement to *Aerospace Medicine and Biology* lists 265 reports, articles and other documents announced during September 1983 in *Scientific and Technical Aerospace Reports (STAR)* or in *International Aerospace Abstracts (IAA)*. The first issue of the bibliography was published in July 1964.

In its subject coverage, *Aerospace Medicine and Biology* concentrates on the biological, physiological, psychological, and environmental effects to which man is subjected during and following simulated or actual flight in the Earth's atmosphere or in interplanetary space. References describing similar effects of biological organisms of lower order are also included. Such related topics as sanitary problems, pharmacology, toxicology, safety and survival, life support systems, exobiology, and personnel factors receive appropriate attention. In general, emphasis is placed on applied research, but references to fundamental studies and theoretical principles related to experimental development also qualify for inclusion.

Each entry in the bibliography consists of a bibliographic citation accompanied in most cases by an abstract. The listing of the entries is arranged by *STAR* categories 51 through 55, the Life Sciences division. The citations, and abstracts when available, are reproduced exactly as they appeared originally in *IAA* or *STAR*, including the original accession numbers from the respective announcement journals. The *IAA* items will precede the *STAR* items within each category.

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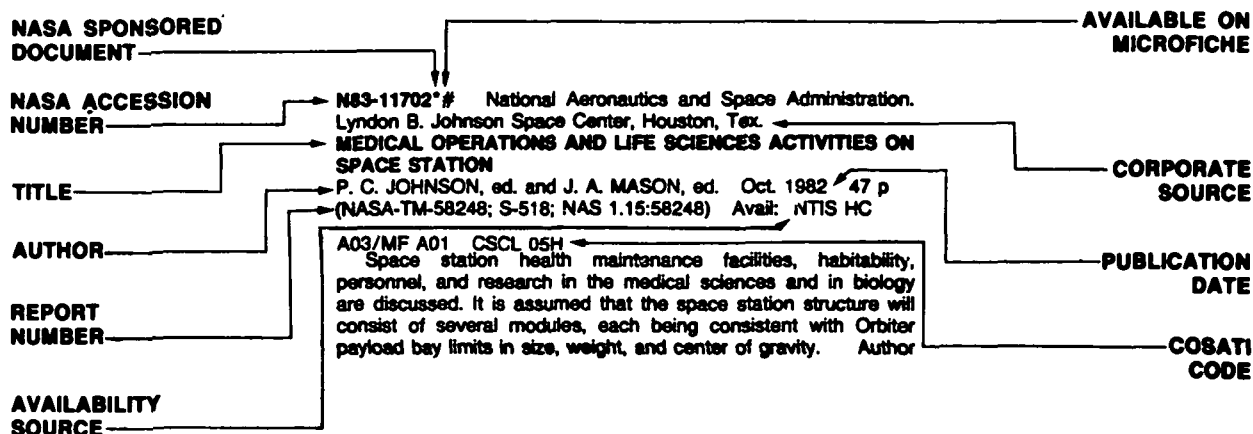
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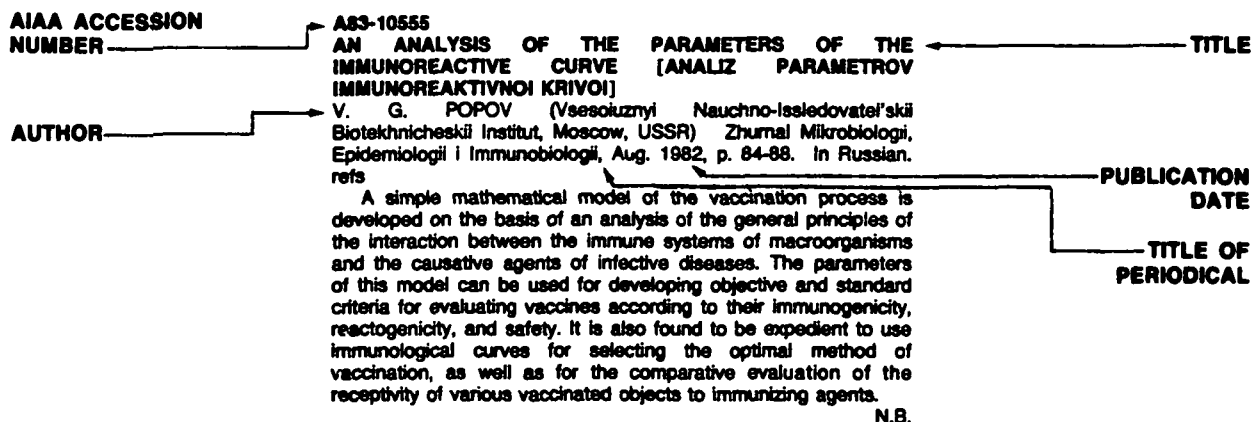
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# AEROSPACE MEDICINE AND BIOLOGY

(A Continuing Bibliography (Suppl. 250))

OCTOBER 1983

51

## LIFE SCIENCES (GENERAL)

Includes genetics.

**A83-36992**

### **O<sub>2</sub> TRANSPORT DURING TWO FORMS OF STAGNANT HYPOXIA FOLLOWING ACID AND BASE INFUSIONS**

S. M. CAIN and R. P. ADAMS (Alabama, University, Birmingham, AL) *Journal of Applied Physiology: Respiratory, Environmental and Exercise Physiology* (ISSN 0161-7567), vol. 54, June 1983, p. 1518-1524 refs

(Contract NIH-HL-14693)

The effects of acid and base infusion on O<sub>2</sub> delivery during circulatory shock were studied in anesthetized dogs. Both the whole body effects and the effects in a hindlimb preparation in which virtually all the responses were attributable to skeletal muscle were investigated. Pericardial tamponade and hemorrhagic hypotension were employed as means of producing circulatory shock. After 30 min of circulatory shock by either method, 0.3 N HCl or 1.0 N NaHCO<sub>3</sub> was infused into the dogs such that the pH was separated by 0.3-0.4 units. The slope of the line relating O<sub>2</sub> uptake to total O<sub>2</sub> transport (blood flow x arterial O<sub>2</sub> concentration) was utilized to evaluate how well the tissues extracted O<sub>2</sub> relative to the O<sub>2</sub> supply. It was determined that acid either improved the distribution of a limiting blood supply to non-muscle organ systems, or increased tissue capillary PO<sub>2</sub> and O<sub>2</sub> diffusion by decreasing hemoglobin O<sub>2</sub> affinity (HOA), or both. The effect of an increased HOA with base infusion was found to be noticeable in hindlimb skeletal muscle only when volume depletion by hemorrhage presumably greatly increased the normally short intercapillary diffusion distance in muscle. N.B.

**A83-36993**

### **INHIBITION OF HYPOXIA-INDUCED ADH RELEASE BY MECLOFENAMATE IN THE CONSCIOUS DOG**

B. R. WALKER (Colorado, University, Denver, CO) *Journal of Applied Physiology: Respiratory, Environmental and Exercise Physiology* (ISSN 0161-7567), vol. 54, June 1983, p. 1624-1629. refs

(Contract NIH-HL-14985)

A study is presented which determined whether hypoxic exposure in conscious dogs, with concomitant increases in cardiac output and arterial blood pressure, results in stimulated release of ADH and whether inhibition of prostaglandin synthesis might affect normal hypoxia-induced ADH release. Hypoxia was induced in five conscious dogs by inhalation of 10 percent O<sub>2</sub>, with and without pretreatment with meclofenamate (2 mg/kg iv and 2 mg/kg-hr). It was found that hypoxic exposure resulted in elevated plasma ADH, although meclofenamate totally blocked this response. Hemodynamic responses to hypoxia were unaffected by meclofenamate, while plasma osmolality was unchanged by hypoxia in both groups. Since meclofenamate does not cross the blood-brain barrier, it is determined that the release of ADH by hypoxia in the conscious dog may be mediated by endogenous prostaglandins, produced outside the central nervous system. It is suggested that elevated renal prostaglandin release, increased

ADH, and hemodynamic alterations could all interact to determine the final renal response to hypoxia. N.B.

**A83-36994**

### **HYPOXIC CONSTRICTION OF ALVEOLAR AND EXTRA-ALVEOLAR VESSELS IN ISOLATED PIG LUNGS**

J. T. SYLVESTER, W. MITZNER, Y. NGEOW, and S. PERMUTT (Johns Hopkins Medical Institutions, Baltimore, MD) *Journal of Applied Physiology: Respiratory, Environmental and Exercise Physiology* (ISSN 0161-7567), vol. 54, June 1983, p. 1660-1666. refs

(Contract NIH-HL-26752)

A study is presented which determined whether hypoxia causes constriction of alveolar or extra-alveolar vessels. The relationships among transpulmonary pressure, pulmonary arterial pressure (Ppa), blood flow (Q), and transvascular fluid filtration rate (W) during normoxia (PO<sub>2</sub> = 200 Torr) and hypoxia (PO<sub>2</sub> = 50 Torr) were investigated in isolated pig lungs perfused with autologous blood. The effects of lung inflation and hypoxic vasoconstriction on the Ppa-Q relationship were found to be similar. When transpulmonary pressure was greater than 5 Torr, both shifted the curve to higher pressures in a parallel manner; although when transpulmonary pressure was less than 5 Torr, inflation had no effect on the Ppa-Q relationship during either normoxia or hypoxia. During normoxia at a transpulmonary pressure of 3.5 Torr, the relationship between fluid filtration rate and flow was found to be characterized by a W of zero at values of Q less than 1.5 l/min and a rapid increase in W with Q above this value. Both hypoxia and inflation were found to shift this relationship to higher filtration rates in a parallel fashion. It is concluded that hypoxia caused constriction of both alveolar and extra-alveolar vessels, resulting in increased intraluminal pressure and filtration of fluid in vessels upstream from the sites of constriction. N.B.

**A83-37235**

### **AN INVESTIGATION OF THE RHYTHMOINOTROPIC DEPENDENCE IN THE HEART DURING ACCIDENTLY VARYING HEARTBEAT RHYTHM [IZUCHENIE RITMOINOTROPNOI ZAVISIMOSTI V SERDTSE PRI SLUCHAINO VAR'IRUIUSHCHEM RITME SERDTSEBIENII]**

V. M. SHEVELEV (Sverdlovskii Inzhenerno-Pedagogicheskii Institut, Sverdlovsk, USSR) and V. IA. IZAKOV (Nauchno-Issledovatel'skii Institut Gigieny Truda i Profzabolevanii, Sverdlovsk, USSR) *Fiziologicheskii Zhurnal (Kiev)* (ISSN 0201-8489), vol. 29, May-June 1983, p. 259-265. In Russian. refs

A method is developed for evaluating the condition of the rhythmoinotropic connection in the intact heart during accidentally varying heartbeat rhythm. This method is based on the theory of accidental functions and describes the natural regime of the work of the heart. The method does not require changes in the frequency of stimulation and utilizes the natural variation in the values of the parameters of the mechanical activity of the heart. Results of investigations of correlative and dispersive functions between the frequency and tension, frequency and pressure, and the tension and pressure show the presence of a rhythmoinotropic relation in the heart in vivo, which is more expressed in the right ventricle. N.B.



A83-37236

**THE RELATION BETWEEN THE DEGREE OF CARDIODYNAMIC DISORDERS AND THE VOLUME OF MYOCARDIAL INJURIES DURING CYTOTOXIC ACTIONS ON THE HEART [SOOTNOSHENIE MEZH DU STEPEN'IU NARUSHENII KARDIODINAMIKI I OB'EMOM POVREZHDENIIA MIOKARDA PRI TSITOTOSKICHESKOM VOZDEISTVII NA SERDTSE]**

G. I. MARCHENKO, L. F. POPOVICH, and I. E. BURIKOV (Akademii Nauk Ukrainskoi SSR, Institut Fiziologii, Kiev, Ukrainian SSR) Fiziologicheskii Zhurnal (Kiev) (ISSN 0201-8489), vol. 29, May-June 1983, p. 266-271. In Russian. refs

Disorders of the cardiodynamics and the contractile function of the myocardium caused by the intracoronary administration of anticardiac cytotoxic serum in dogs are compared with the volume of the myocardial injuries, as well as the structural and metabolic changes in the myocardium. The degree of the morphological and metabolic shifts in the myocardium is determined by the volume and depth of the injuries of the heart muscles and probably by the expressiveness of the mechanisms for the compensation of the disorders of the hemodynamics and the heart function. It is shown that the sympathoadrenal system participates in the compensation of the disorders of the heart function which induce an increase in the concentration of noradrenaline in the noninjured areas and a stabilization or increase in the contractile function of these areas, as well as various histochemical and morphological manifestations of these effects. N.B.

A83-37237

**THE ROLE OF FREE FATTY ACIDS IN THE ACCUMULATION OF THROMBOCYTES AND THE DEVELOPMENT OF MYOCARDIAL INJURIES DURING PROLONGED ADRENALIN ADMINISTRATION [O ROLI SVOBODNYKH ZHIRNYKH KISLOT V NAKOPLENII TROMBOTSITOV I VOZNIKNOVENII POVREZHDENII MIOKARDA PRI DLITEL'NOM VVEDENII ADRENALINA]**

I. P. GERELIUK (Ivano-Frankovskii Meditsinskii Institut, Ivano-Frankovsk, Ukrainian SSR) Fiziologicheskii Zhurnal (Kiev) (ISSN 0201-8489), vol. 29, May-June 1983, p. 280-286. In Russian. refs

A83-37239

**THE EFFECT OF INSULIN ON THE REACTION OF THE CORONARY AND SYSTEMIC BLOOD CIRCULATION DURING THE INSPIRATION OF HYPOXIC MIXTURES [VLIANIE INSULINA NA REAKTSII KORONARNOGO I SISTEMNOGO KROVOOBRAZHCENIIA PRI VDYKHANII GIPOKSICHESKOI SMESI]**

L. F. IAKUSHEVA (Kievskii Institut Endokrinologii i Obmena Veshchestv, Kiev, Ukrainian SSR) Fiziologicheskii Zhurnal (Kiev) (ISSN 0201-8489), vol. 29, May-June 1983, p. 309-315. In Russian. refs

The physiological patterns of the effect of insulin on the coronary and systemic blood circulation were studied in conditions of intensified functional activity of the cardiovascular system, focusing on the reactions to the inspiration of air mixtures with low concentrations of oxygen. The experiments were performed on anesthetized mongrel dogs with the use of autoperfusion of the coronary and femoral arteries with constant flow pumps; the synchronous registration of hemodynamics, respiration, and arterial blood oxygen saturation; and the determination of the pH, pO<sub>2</sub>, pCO<sub>2</sub> and glucose levels in the blood. It is found that small doses of insulin increase the degree of the pressor reactions of arterial pressure and bradycardia during respiration with hypoxic mixtures. Insulin also limits the normal enlargement of coronary arteries in response to respiration with hypoxic mixtures, a reaction which is mediated through the activation of cardiac beta-adrenoreceptors. N.B.

A83-37240

**SEVERAL MECHANISMS OF THE TRANSPORT OF OXYGEN AND ITS UTILIZATION IN THE SKELETAL MUSCLES DURING ACUTE HEMIC HYPOXIA [NEKOTORYE MEKHANIZMY TRANSPORTA KISLORODA I EGO UTILIZATSII V SKELETNOI MYSHTSE PRI OSTROI GEMICHESKOI GIPOKSII]**

I. N. MANKOVSKAIA and M. M. FILIPPOV (Akademii Nauk Ukrainskoi SSR, Institut Fiziologii, Kiev, Ukrainian SSR) Fiziologicheskii Zhurnal (Kiev) (ISSN 0201-8489), vol. 29, May-June 1983, p. 327-331. In Russian. refs

The conditions for the development of hypoxia of the skeletal muscles were studied in rats by characterizing the total gas exchange, the oxygen parameters and the acid-base balance of the arterial and venous blood, and the intensity of oxygen consumption in the muscles during acute hemic hypoxia. The acute hemic hypoxia was induced by subcutaneous injections of an aqueous solution of NaNO<sub>2</sub>. The respiration rate increased and the gas exchange decreased 45-50 min after the injection of NaNO<sub>2</sub>. The concentration of methemoglobin comprised 1/3 of the total content of hemoglobin and the oxygen capacity of the blood decreased, while the oxygen tension and saturation remained unchanged as compared with control values. A significant acid shift in the pH and acid-base disorders were observed. The intensity of oxygen consumption decreased, as did the rate of the blood flow through the muscles. The pathogenesis of hypoxia in these conditions is due to the inhibiting action of NaNO<sub>2</sub> on the activity of respiratory enzymes, the limiting of O<sub>2</sub> due to the inactivation of 1/3 of the hemoglobin, and the decrease in the blood flow in the muscles. N.B.

A83-37242

**THE POSSIBLE INTERACTIONS OF INSPIRATORY AND EXPIRATORY NEURONAL SYSTEMS [O VOZMOZHNYKH VZAIMODEISTVIIAKH INSPIRATORNOI I EKSPIRATORNOI NEIRONAL'NYKH SISTEM]**

N. IA KIREEVA, N. A. GORDIEVSKAIA (Akademii Meditsinskikh Nauk SSSR, Kuibyshev, USSR), and M. V. SERGIEVSKII (Fiziologicheskii Zhurnal SSSR (ISSN 0015-329X), vol. 69, April 1983, p. 439-444. In Russian. refs

In order to clarify the contradictory opinions about the characteristics of the inspiratory and expiratory neuronal systems, the reactions of neurons of the lateral zone of the respiratory center and the diaphragmatic and intercostal nuclei were studied in anesthetized cats during the electrical stimulation of these inspiratory and expiratory regions. Results show that the interactions of the inspiratory and expiratory systems are reciprocal inhibitory interactions. The stimulation of inspiratory regions sharply weakens or stops entirely the activity of the overwhelming majority of the expiratory neurons, while the stimulation of the expiratory region evokes a cessation of the activity of inspiratory neurons. N.B.

A83-37245

**THE DIFFUSION CAPABILITY OF THE HEMATOPARENCHYMATOUS BARRIER FOR OXYGEN DURING THE BREATHING OF HELIUM-OXYGEN GAS MIXTURES [DIFFUZIONNAIA SPOSOBNOST' GEMATOPARENKHIMATOZNOGO BAR'ERA DLIA KISLORODA V USLOVIAKH DYKHANIIA GELIO-KISLORODNYMI GAZOVYMI SMESIAMI]**

V. A. BEREZOVSKII and V. I. NOSAR (Akademii Nauk Ukrainskoi SSR, Institut Fiziologii, Kiev, Ukrainian SSR) Fiziologicheskii Zhurnal SSSR (ISSN 0015-329X), vol. 69, April 1983, p. 489-494. In Russian. refs

The mass transport of oxygen across the hematoparenchymatous barrier is investigated in rabbits during the breathing of normoxic and hypoxic helium-oxygen gas mixtures at normal atmospheric pressure. The partial oxygen pressure in the arterial and venous blood of the hindlimb, the local blood flow, the oxygen tension in the muscles, and several other parameters were measured, and the diffusion capability of the hematoparenchymatous barrier of the muscle was calculated. Results show that the hematoparenchymatous barrier's capacity

for oxygen increases during the breathing of helium-oxygen mixtures in comparison with the analogous value during the breathing of air. During the breathing of hypoxic helium-oxygen and nitrogen-oxygen mixtures (11 percent O<sub>2</sub>), the diffusion capability of the hematoparenchymatous barrier for oxygen is found to be higher than during the breathing of corresponding normoxic gas mixtures. The possible pharmacological effects of the action of helium on the plasmatic membrane components of the hematoparenchymatous barrier are examined. N.B.

#### A83-37247

##### **PULMONARY GAS EXCHANGE IN CATS UNDER A HEAT LOAD [LEGOCHNYI GAZOGBMEN U KOSHEK PRI TEPLOVOI NAGRUZKE]**

D. P. DVORETSKII and V. A. TASHLIEV (Akademiia Meditsinskikh Nauk SSSR, Leningrad, USSR) *Fiziologicheskii Zhurnal SSSR* (ISSN 0015-329X), vol. 69, April 1983, p. 513-519. In Russian. refs

The effect of heat stress on the pulmonary gas exchange was investigated in cats and the parameters of the acid-base balance were determined under these conditions. Moderate heat stress caused by increasing the environmental temperature to 50 °C evoked no significant disorders of the pulmonary gas exchange and the acid-base balance of the blood in the cats. Extreme heat stress at body temperatures higher than 39.4 ± 0.17 °C caused sharp increases in the ratios of the minute volume of breathing to the minute volume of the blood, the ventilation of the respiratory dead space to the alveolar ventilation, and the combination of respiratory alkalosis with metabolic acidosis. The stabilization of the respiratory minute volume due to an artificial ventilation apparatus blocked the compensatory reaction of the external respiratory system and decreased the tolerance to heat loads. N.B.

#### A83-37248

##### **THE NONUNIFORMITY OF THE DESCENDING PATHS WHICH ACTIVATE THE SYMPATHETIC PREGANGLION NEURONS OF SUPERIOR SEGMENTS OF THE SPINAL CORD [O NEODNORODNOSTI NISKHODIASHCHIKH PUTEI, AKTIVIRUIUSHCHIKH SIMPATICHESKIE PREGANGLIONARNYE NEIRONY VERKHNEGRUDNYKH SEGMENTOV SPINNOGO MOZGA]**

A. V. KRASIUKOV, A. KH. KADE, V. P. LEBEDEV, and S. A. NIKITIN (Akademiia Nauk SSSR, Institut Fiziologii, Leningrad, USSR) *Fiziologicheskii Zhurnal SSSR* (ISSN 0015-329X), vol. 69, April 1983, p. 520-527. In Russian. refs

It was found in experiments with anesthetized, immobilized, and artificially ventilated cats that two types of fibers carry the effects from the ventrolateral part of the medulla oblongata to the sympathetic preganglion neurons of the T2 segment. One type is fast conducting (12.3 ± 3.2 m/s), while the other is slower (about 6 m/s). The activating effect on the sympathetic neurons from the more caudal segments, beginning with T4, are carried by fibers of only the second type. Both groups of fibers are axon neurons, situated in the caudal region of the M and S zones. It was determined that the sympathetic neurons of the T2 segment activate the descending paths with a conduction velocity of 5.7 ± 0.6 m/s, which originates in the dorsal-caudal region of the medulla oblongata. The more rapidly conducting paths were found to participate in the transmission of central pupilodilatory effects. N.B.

#### A83-37249

##### **THE FUNCTIONAL CONDITION OF THE RESPIRATORY CENTER DURING THE COUGHING REFLEX IN NORMOXIC AND HYPOXIC CONDITIONS [FUNKSIONAL'NOE SOSTOIANIE DYKHATEL'NOGO TSENTRA V PERIOD OSUSHCHESTVLENIIA KASHLEVOGO REFLEKSA V USLOVIAKH NORMOKSII I GIPOKSII]**

A. M. KULIK, L. N. KONDRATEVA (Akademiia Meditsinskikh Nauk SSSR, Moscow, USSR), J. KOPAS, and M. TATAR (Komenskeho Univerzita, Martin, Czechoslovakia) *Fiziologicheskii Zhurnal SSSR* (ISSN 0015-329X), vol. 69, April 1983, p. 536-539. In Russian. refs

The impulse activity of the respiratory neurons of the medulla oblongata and the electrical activity of the diaphragm and the intercostal muscles were studied in anesthetized cats before, during, and after a coughing attack in normoxic and hypoxic conditions. The intrapleural pressure was recorded and the PaO<sub>2</sub>, PaCO<sub>2</sub>, and SaO<sub>2</sub> in the arterial blood were determined. It was found that during coughing, a massive excitation of the inspiratory and expiratory neurons occurred, as well as a significant increase in the electrical activity of the respiratory muscles. Following the cessation of the coughing, the activity of the neurons and muscles quickly returned to their initial levels. During acute hypoxia, the coughing attack was shortened and the coughs were weakened in comparison with coughing under normoxic conditions. After the coughing attack, the PaCO<sub>2</sub> in the arterial blood sharply fell, the neuron firing activity and the rhythmic activity of the muscles were disrupted, and apnea occurred as a result of hyperventilation during the coughing attack. After 20-40 sec, the rhythmic firing activity of the inspiratory neurons of the medulla oblongata stopped the apnea. N.B.

A83-37250\* National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.

##### **EFFECT OF SPACEFLIGHT ON PERIOSTEAL BONE FORMATION IN RATS**

T. J. WRONSKI and E. R. MOREY (NASA, Ames Research Center, Biomedical Research Div., Moffett Field, CA) *American Journal of Physiology* (ISSN 0002-9513), vol. 244, 1983, p. R305-R309. refs

Male Wistar rats were placed in orbit for 18.5 days aboard the Soviet COSMOS 1129 biological satellite. Tetracycline was administered before and after spaceflight to label areas of bone formation. An inhibition of periosteal bone formation occurred during spaceflight in the tibial and humeral diaphyses, but this defect was corrected during the postflight period. The increased extent of arrest lines at these skeletal sites suggested that periosteal bone formation may have even ceased during spaceflight. The rib exhibited a small but nonsignificant decrease in periosteal bone formation. Endosteal bone resorption was not affected markedly by spaceflight conditions. The observed inhibition of periosteal bone formation may be a result of mechanical unloading, but endocrine factors cannot be ruled out. Author

#### A83-37772

##### **PHYSIOLOGICAL CORRELATES OF PROLONGED SLEEP DEPRIVATION IN RATS**

A. RECHTSCHAFFEN, M. A. GILLILAND, B. M. BERGMANN, and J. B. WINTER (Chicago, University, Chicago, IL) *Science* (ISSN 0036-8075), vol. 221, July 8, 1983, p. 182-184. refs (Contract NIH-MH-4151; NIH-MH-18428)

The issue of whether sleep is physiologically necessary has been unresolved because experiments that reported deleterious effects of sleep deprivation did not control for the stimuli used to prevent sleep. In this experiment, however, experimental and control rats received the same relatively mild physical stimuli, but stimulus presentations were timed to reduce sleep severely in experimental rats but not in controls. Experimental rats suffered severe pathology and death; control rats did not.

A83-38075

THE EFFECT OF THYROXIN ON THE CONCENTRATION OF LIPOPROTEINS OF VARIOUS DENSITIES IN THE BLOOD SERUM OF RATS [VLIANIE TIROKSINA NA SODERZHANIE LIPOPROTEIDOV RAZLICHNOI PLOTNOSTI V SYVOROTKE KROVI KRYSA]

M. I. AZIMOVA (Akademiia Nauk Uzbekskoi SSR, Institut Biokhimi, Ulukbek, Uzbek SSR) Akademiia Nauk Uzbekskoi SSR, Doklady (ISSN 0134-4307), no. 11, 1982, p. 46, 47. In Russian. refs

A83-38125

THE METABOLISM OF LIPOPROTEINS IN CONDITIONS OF EXPERIMENTAL HYPERTHYROIDISM [METABOLIZM LIPOPROTEIDOV V USLOVIAKH EKSPERIMENTAL'NOGO GIPERTIROZISA]

M. I. AZIMOVA (Akademiia Nauk Uzbekskoi SSR, Institut Biokhimi, Ulukbek, Uzbek SSR) Akademiia Nauk Uzbekskoi SSR, Doklady (ISSN 0134-4307), no. 9, 1982, p. 50-52. In Russian.

The effect of thyroid hormones on the biosynthesis, blood plasma concentration, and catabolism of lipoproteins was investigated, focusing on the structure and lipid-protein composition of the lipoproteins which determine the development of atherosclerosis. Results show that important changes occur in the metabolism of lipoproteins during the development of experimental hyperthyroidism, including an acceleration of the processes of the catabolism of very low density lipoproteins (VLDL) and low density lipoproteins (LDL). The speed of the biosynthesis of lipids in the liver increases during an absence of changes in the biosynthesis of apo-VLDL. A significant part of the newly synthesized lipids do not form a complex with apoproteins and are not transported to the blood. As a result of the activation of lipolytic processes in the peripheral tissues induced by thyroxine, the hydrolysis of VLDL triglycerides and their transformation into LDL occur. Simultaneously, thyroxine significantly accelerates the catabolism of LDL. It is proposed that the action of thyroxine on the metabolism of lipoproteins of various densities can explain their participation in the prevention of atherosclerotic changes. N.B.

A83-38175

NONSPECIFIC ESTERASES OF THE EXTRAMURAL GANGLIA OF THE AUTONOMOUS NERVOUS SYSTEM IN RABBITS DURING ACUTE EXPERIMENTAL EMOTIONAL STRESS [NESPETSIFICHESKIE ESTERAZY EKSTRAMURAL'NYKH UZLOV AVTONOMNOI NERVNOI SISTEMY KROLIKA PRI OSTROM EKSPERIMENTAL'NOM EMOTSIONAL'NOM STRESSE]

N. V. PETROVA, S. I. KASHTANOV (Akademiia Meditsinskikh Nauk SSSR, Moscow, USSR), and V. V. PORTUGALOV (Patologicheskaya Fiziologiya i Eksperimental'naya Terapiia (ISSN 0031-2991), Jan.-Feb., Feb. 1983, p. 42-45. In Russian. refs

A83-38187

THE EFFECT OF LOW-FREQUENCY ACOUSTIC VIBRATIONS ON THE PHOSPHOLIPID COMPOSITION OF THE WHOLE BLOOD AND SOME TISSUES OF ANIMALS [VLIANIE NIZKOCHESTOTNYKH AKUSTICHESKIKH KOLEBANI NA FOSFOLIPIDNYI SOSTAV TSEL'NOI KROVI I NEKOTORYKH TKANZI ZHIVOTNYKH]

S. V. ALEKSEEV, V. I. SVIDOVYI, and L. N. VELICHENKO (Sanitaro-Gigienicheskii Meditsinskii Institut, Leningrad, USSR) Gigiena Truda i Professional'nye Zabolovaniia, March 1983, p. 39-41. In Russian. refs

A83-38195

DISORDERS OF THE CONTRACTILE FUNCTION OF THE MYOCARDIUM AND THE ULTRASTRUCTURE OF THE CARDIOMYOCYTES FOLLOWING EMOTIONAL AND PAINFUL STRESS [NARUSHENIE SOKRATITEL'NOI FUNKTSII MIOKARDA I UL'TRASTRUKTURY KARDIOMIOTSITOV POSLE EMOTSIONAL'NO-BOLEVOGO STRESSA]

F. Z. MEERSON, N. V. SAMOSUDOVA, E. V. GLAGOLEVA, M. V. SHIMKOVICH, and L. M. BELKINA (Akademiia Meditsinskikh Nauk SSSR, Moscow, USSR; Akademiia Nauk SSR, Institut Biologicheskoi Fiziki, Pushchino, USSR) Arkhiv Anatomii, Gistologii i Embriologii (ISSN 0004-1947), vol. 84, Feb. 1983, p. 43-49. In Russian. refs

The sensitivity of the isolated heart of rats who had undergone emotional and painful stress (using the method of Desiderato et al., 1974) to an excess or deficit of calcium in the perfusate was compared with the concentration of calcium in the sarcoplasm of the cardiomyocytes. Results show that the dependence of the contractile function of the isolated heart on the concentration of calcium in the perfusate increased following emotional and painful stress in rats. A simultaneous increase in the quantity of calcium located in the cytoplasm of the cardiomyocytes, especially in the subsarcolemma region, was observed. These results indicate the injury of the membrane mechanisms of calcium transport and the increase in the concentration of calcium in the sarcoplasm, which may play a role in the development of myocardial disorders following stress. N.B.

A83-38196

MORPHOLOGICAL CHANGES IN THE ADENOHYPOPHYSIS DURING THE RECOVERY PERIOD FOLLOWING SINGLE INDIVIDUALLY-GRADED PHYSICAL LOADS [MORFOLOGICHESKIE IZMENENIYA ADENOGIPOFIZA V VOSSTANOVITEL'NOM PERIODE POSLE ODNOKRATNYKH INDIVIDUAL'NO DOZIROVANNYKH FIZICHESKIKH NAGRUZOK]

M. I. SAMARIN (Gor'kovskii Meditsinskii Institut, Gorki, USSR) Arkhiv Anatomii, Gistologii i Embriologii (ISSN 0004-1947), vol. 84, Feb. 1983, p. 50-55. In Russian. refs

The structural changes which occur in the anterior part of the adenohipophysis during the recovery period following single individually-graded physical loads (estimated by the oxygen consumption) were investigated in mongrel dogs. Results show that structural changes which characterize the recovery period do not appear by the first day following the physical load. It is proposed that an additional activation of the adenohipophysis is required to evoke these changes, which results in an oscillatory character of the recovery process, in particular during the supercompensatory phase. In addition, a heterochronism of several morphological and functional parameters of the adenohipophysis is observed. It is concluded that the expression of the recovery of the anterior part of the adenohipophysis following functional loads depends on the size of the physical load, in which the greater the load, the more active, economic, and effective is the recovery of the gland. N.B.

A83-38198

CHANGES IN THE LIVER OF WHITE RATS UNDER THE INFLUENCE OF LOW TEMPERATURES [IZMENENIYA V PECHENII BELYKH KRYSA POD VLIANIEM NIZKOI TEMPERATURY]

A. A. ZHIRNOVA, N. N. SHIROKOVA, and B. IA. RIZHAVSKII (Khabarovskii Meditsinskii Institut, Khabarovsk, USSR) Arkhiv Anatomii, Gistologii i Embriologii (ISSN 0004-1947), vol. 84, Feb. 1983, p. 65-69. In Russian. refs

The effect of 80 days at low temperatures (23 hours per day at 5-7°C) on the liver of white rats was studied using morphometric techniques. Results show that a decrease in the liver mass, an increase in the percentage of binuclear hepatocytes, and a decline in the karyometric indices were found in the rats immediately following the cold exposure. These changes were also observed in the rats 35 days following the end of the cold exposure. Four months after the end of the cold exposure, the fraction of binuclear

hepatocytes and the sizes of the nuclei were found to be greater than the control values. It is concluded that a chronic exposure to low temperatures leads to the appearance of morphometric changes in the liver which reflect changes in the metabolic processes taking place inside the liver. N.B.

#### A83-38605

##### **THERMAL NEUTRONS COULD BE A CAUSE OF BIOLOGICAL EXTINCTIONS 65 MYR AGO**

A. A. YAYANOS (California, University, La Jolla, CA) *Nature* (ISSN 0028-0836), vol. 303, June 30, 1983, p. 797-800. NSF-supported research. refs

The possibility that the extinctions that occurred during the Cretaceous-Tertiary transition were produced by neutron activation is explored. The neutrons could have arisen from a supernova, the sun, and or explosion at the galactic center. The fluxes would have briefly raised the thermal neutron background level on the earth, interacted with seawater and organisms to form isotopes, affected all living creatures, some fatally by the decay of Ca-45, P-32, and S-35, and induced the mutations in the early Tertiary defined by the fossil record. Heuristic calculations demonstrate the feasibility of a large neutron flux at the earth's surface as a result of a supernova explosion over 65 Myr ago. The effects of the neutron activation would be most prevalent in seawater, a prediction borne out by atomic bomb tests. The isotope Ca-45 would have migrated to the bones of large animals, such as dinosaurs, most probably through the food chain, and caused death. The absorbed flux would have amounted to 4700 rads/year for the coccolithophore, a dose which known to reduce marine bacteria populations 67 pct in a yr. Further work on the biogeochemical cycles of the activated elements is indicated. M.S.K.

A83-38607\* Massachusetts Inst. of Tech., Cambridge.

##### **NEGATIVELY SUPERCOILED SIMIAN VIRUS 40 DNA CONTAINS Z-DNA SEGMENTS WITHIN TRANSCRIPTIONAL ENHANCER SEQUENCES**

A. NORDHEIM and A. RICH (MIT, Cambridge, MA) *Nature* (ISSN 0028-0836), vol. 303, June 23, 1983, p. 674-678. Research supported by the National Institutes of Health, American Cancer Society and NASA. refs

Three 8-base pair (bp) segments of alternating purine-pyrimidine from the simian virus 40 enhancer region form Z-DNA on negative supercoiling; minichromosome DNase I-hypersensitive sites determined by others bracket these three segments. A survey of transcriptional enhancer sequences reveals a pattern of potential Z-DNA-forming regions which occur in pairs 50-80 bp apart. This may influence local chromatin structure and may be related to transcriptional activation. Author

#### A83-38893

##### **CATALYTIC MECHANISM OF HISTONE IN PEPTIDE FORMATION FROM PHENYLALANYL ADENYLATE**

N. YAMAMOTO (Utsunomiya University, Utsunomiya, Japan), M. ISHIGAMI, and M. KINJO (Jichi Medical School, Minamikawachi, Tochigi, Japan) *Origins of Life* (ISSN 0302-1688), vol. 12, Dec. 1982, p. 355-359. refs

The role of histones as a catalyst for the formation of peptides from phenylalanyl adenylate is investigated. It was found that the rate of proton release was directly proportional to the concentration of histone. Basic conditions due to solubilized and aggregated histone were found to accelerate the rate of peptide formation from phenylalanyl adenylate, but the presence of free basic amino acids did not accelerate this reaction. These results indicate that the formation of basic polypeptides in protobiotic conditions might accelerate the formation of polypeptides, which could possibly serve as a positive feedback mechanism in protein synthesis. N.B.

#### A83-38894

##### **MATERIAL CYCLING AND ORGANIC EVOLUTION**

H. MIZUTANI and E. WADA (Mitsubishi-Kasei Institute of Life Sciences, Machida, Tokyo, Japan) *Origins of Life* (ISSN 0302-1688), vol. 12, Dec. 1982, p. 369-376. refs

It is proposed that the formation and development of a material cycling system was an absolutely necessary part of the sequence of events toward the phenomenon of life. The increase in the amount of recycled matter within biological groups and the increasing complexity of the cycling network are viewed as the early development of life soon after its appearance on earth. It is argued that the origin of a cell cannot by itself be regarded as the origin of life. The origin of a cell must be followed by the formation of a cycle of materials between cells if these cells are to remain on earth long enough so that they can be considered life. A quantitative analysis of life is developed based on this biogeochemical viewpoint. A formula is developed to analyze the possible early developments of life and the impact of present human activity on the global carbon cycle. N.B.

#### A83-38895

##### **EFFECT OF HIGH ATMOSPHERIC CO<sub>2</sub> CONCENTRATION ON DELTA C-13 OF ALGAE - A POSSIBLE CAUSE FOR THE AVERAGE DEPLETION OF C-13 IN PRECAMBRIAN REDUCED CARBON**

H. MIZUTANI and E. WADA (Mitsubishi-Kasei Institute of Life Sciences, Machida, Tokyo, Japan) *Origins of Life* (ISSN 0302-1688), vol. 12, Dec. 1982, p. 377-390. refs

#### A83-38896

##### **COMPARATIVE STUDIES ON BIOCHEMICAL PROPERTIES OF PROTEIN SYNTHESIS OF AN ARCHAEABACTERIA, THERMOPLASMA SP**

M. OHBA and T. OSHIMA (Mitsubishi-Kasei Institute of Life Sciences, Machida, Tokyo, Japan) *Origins of Life* (ISSN 0302-1688), vol. 12, Dec. 1982, p. 391-394. refs

An acido-thermophilic archaeobacteria, *Thermoplasma* strain KO-2, produced poly(A) containing RNA. The isolated poly(A)RNA showed the messenger activity in a cell-free extract of rabbit reticulocyte, indicating that the RNA is mRNA of the archaeobacteria. 7-Methylguanosine 5'-phosphate did not inhibit the reaction, suggesting that the cap structure is not present in the messenger. These results may suggest that poly(A) containing messenger arose at very early stage of evolution prior to the divergence between archaeobacteria and eukaryotes. Author

#### A83-38898

##### **ENANTIOSELECTIVE CATALYSIS AS A POSSIBLE PATH FOR OPTICAL ACTIVATION OF ORGANIC COMPOUNDS IN NATURE**

E. I. KLABUNOVSKII (Akademii Nauk SSSR, Institut Organicheskoi Khimii, Moscow, USSR) *Origins of Life* (ISSN 0302-1688), vol. 12, Dec. 1982, p. 401-404. refs

#### A83-38899

##### **A MODEL FOR THE DEVELOPMENT OF GENETIC TRANSLATION**

C. C. KING (Auckland University, Auckland, New Zealand) *Origins of Life* (ISSN 0302-1688), vol. 12, Dec. 1982, p. 405-425. refs

Models for the development of the genetic code and translation apparatus are reviewed, focusing on the hypercycle model of Eigen and Schuster (1977, 1978). Several of these ideas are utilized to develop a new model of the genetic code and translation in which the pairs AU and GC play complementary roles, and in which tRNAs develop from a molecule with two loops which stack in repetitive patterns without the need for a messenger RNA. This phenomenon could serve as a bridge between random (or autocatalytic) polymerization and coded translation. In addition, alternative postulates to several ideas of Eigen and Schuster are examined using computer simulations. N.B.

A83-38928

**THE SENSITIVITY BY AGE OF ANIMALS TO ELECTROMAGNETIC FIELDS AT MICROWAVE FREQUENCIES [VOZRASTNAIA CHUVSTVITEL'NOST' ORGANIZMA ZHIVOTNOGO K ELEKTROMAGNITNYM POLIAM SVERKHOVYSOKIKH CHASTOT]**

I. P. KOZIARIN and I. I. SHVAIKO (Kievskii Meditsinskii Institut, Kiev, Ukrainian SSR) Gigiena i Sanitariia (ISSN 0016-9900), March 1983, p. 86-89. In Russian. refs

The effects of electromagnetic fields in the microwave range on animals at various stages of development are investigated. Four series of experiments were conducted in which adolescent, pre-adolescent, post-reproductive and in utero embryonic rats were exposed to 126-cm radiation at flux densities of 10 and 100 microW/sq cm for 2 hours a day for up to 4 months. The majority of the overall indicators (body weight, rectal temperature etc.) are found not to differ between the irradiated and control animals, however significant effects are observed in indicators of nervous systems functions, particularly in pre-adolescent animals. The nervous system changes are associated with increased thyroid activity in adolescent rats and a trend toward increasing levels in pre-adolescents. Changes in biochemical indicators were most marked in the pre-adolescent animals, and the interorgan distributions of microelements were also affected. Nervous system effects are also observed in embryonic rats, along with an increase in pre-implantation mortality and decreased litter size. It is concluded that differential age sensitivity, with pre-adolescents being most susceptible, should be taken account of in the setting of maximum values for microwave fields in populated areas.

A.L.W.

A83-38943#

**THE ACTIVITY OF THE ITALIAN AIR RESCUE SERVICE IN THE TRANSPORT OF HIGH-RISK PATIENTS IN EMERGENCY SITUATIONS [ATTIVITA' DEL SOCCORSO AEREO ITALIANO NEL TRASPORTO DI MALATI AD ALTO RISCHIO NELLE URGENZE INSULARI]**

G. ROTONDO (Aeronautica Militare Servizio di Sanita, Rome, Italy) and A. BIZZARRI (Aeronautica Militare, Direzione di Sanita, Rome, Italy) (Convegno Internazionale sulle Emergenze Medico-Chirurgiche in Area Portuale e nelle Isole Minori, Livorno, Italy, Apr. 16-18, 1982) Rivista di Medicina Aeronautica e Spaziale (ISSN 0035-631X), vol. 46, July-Dec. 1981, p. 7-26. In Italian. refs

The operational and medical features of the helicopters used by the Italian Air Rescue Service are examined, including the modern medical equipment located on board the helicopter used for treating patients during flight. The organization of the 15th wing of the Italian Air Rescue Service is discussed in detail, as well as the technical and avionics equipment of the Sikorsky HH-3F helicopter. Military aviation medical and paramedical personnel who have been trained to operate in flight are present on every flight in order to provide adequate assistance for any emergency. In addition, the air rescue missions carried out by the 15th wing of the Italian Air Rescue Service during the past four years are surveyed.

N.B.

A83-38946#

**TOPICAL AND SYSTEMIC EFFECTS OF THE OIL AER-M-O 261G BATCH NO. 4 IN MICE - ANATOMOPATHOLOGICAL AND HISTOLOGICAL FINDINGS [EFFETTI TOPICI E SISTEMICI DELL'OLIO AER-M-O 261 G BATCH N. 4 NEL TOPO - REPERTI ANATOMO-PATOLOGICI ED ISTOLOGICI]**

G. SIMINI, A. FATTOROSSO, and R. DAMELIO (Scuola Militare di Sanita Aeronautica; Centro Studi e Ricerche di Medicina Aeronautica e Spaziale, Rome, Italy) Rivista di Medicina Aeronautica e Spaziale (ISSN 0035-631X), vol. 46, July-Dec. 1981, p. 156-166. In Italian.

The effects of the hydraulic oil AER-M-O 261g batch no. 4 applied to areas of shaved skin for 30 days were investigated in Swiss white mice. The topical and systemic effects were determined, and the reactions caused by new and used oil were compared. Results show that almost all of the animals exhibited

asthemia, anorexia, and irritability by the end of the 30 day period. A severe form of dermatitis was observed at the site of the oil application, which histological examinations showed to be a polymorphonuclear infiltration ranging from the deep dermis up to the epidermis. In addition, autopsies revealed hepatic and renal abscesses in all animals, regardless of the type of oil employed. It is concluded that the observed lesions were due to a direct toxic effect of the oil components on the skin of the animals.

N.B.

A83-38948\* California Univ., Irvine

**SPECTRAL CONSEQUENCES OF PHOTORECEPTOR SAMPLING IN THE RHESUS RETINA**

J. I. YELLOTT, JR. (California, University, Irvine, CA) Science (ISSN 0036-8075), vol. 221, July 22, 1983, p. 382-385 Research supported by the Alfred P. Sloan Foundation. refs (Contract NCA2-OR-345-301)

Optical transforms were used to compute the power spectra of rhesus cones treated as arrays of image sampling points. Spectra were obtained for the central fovea, parafovea, periphery, and far periphery. All were consistent with a novel spatial sampling principle that introduces minimal noise for spatial frequencies below the Nyquist limits implied by local receptor densities, while frequencies above the nominal Nyquist limits are not converted into conspicuous moire patterns, but instead are scattered into broadband noise. This sampling scheme allows the visual system to escape aliasing distortion despite a large mismatch between retinal image bandwidth and the Nyquist limits implied by extrafoveal cone densities.

Author

A83-39496

**THE DECREASE IN THE FUNCTIONAL ABILITY OF THE HYPERTROPHIC HEART DUE TO DISORDERS OF CELLULAR ADAPTATION TO OXYGEN [SNIZHENIE FUNKSIONAL'NOI SPOSOBNOSTI GIPERTROFIRUETTANNOGO SERDTSA PRI NARUSHENII ADAPTATSII KLETOK K KISLORODU]**

E. A. DEMUROV, A. M. GERASIMOV, V. I. MILCHAKOV, I. B. KOLOSKOV, I. N. TELEGIN, and S. N. EFUNI (Akademiia Meditsinskikh Nauk SSSR; Tsentral'nyi Nauchno-Issledovatel'skii Institut Travmatologii i Ortopedii, Moscow, USSR) Akademiia Nauk SSSR, Doklady (ISSN 0002-3264), vol. 270, no. 4, 1983, p. 1001-1004. In Russian. refs

A83-39497

**EARLY ULTRASTRUCTURAL CHANGES IN THE AUDITORY LABYRINTH OF FROGS PRODUCED BY THE ACTION OF PULSED ULTRASOUND [RANNIE UL'TRASTRUKTURNYE IZMENENIYA V USHNOM LABIRINTE LIAGUSHKI PRI DEISTVII IMPUL'SNOGO UL'TRAZVUKA]**

G. I. RATNIKOVA and E. E. SHCHEKANOV (Akademiia Nauk SSSR, Institut Evoliutsionnoi Fiziologii i Biokhimii, Leningrad, USSR) Akademiia Nauk SSSR, Doklady (ISSN 0002-3264), vol. 270, no. 4, 1983, p. 1005-1007. In Russian. refs

A83-39520

**THE BIOSYNTHESIS OF CHOLESTEROL IN THE TISSUES OF IRRADIATED RATS [BIOSINTEZ KHOLESTERINA V TKANIAXH OBLUCHENNYKH KRYSA]**

I. K. KOLOMITSEVA, E. G. NOVOSELOVA, A. M. KUZIN (Akademiia Nauk SSSR, Institut Biologicheskoi Fiziki, Pushchino, USSR), and G. E. NURULLAEVA (Akademiia Nauk SSSR, Doklady (ISSN 0002-3264), vol. 270, no. 3, 1983, p. 741, 742. In Russian. refs

The incorporation rate of 2-(C-14)-acetate into cholesterol in various organs of rats irradiated with gamma-rays was determined. The incorporation rate was determined at times following the introduction of the label when the cholesterol in the blood was not radioactive. The measurements were performed 48 hr after the animals received an 8 gram-roentgen dose of radiation. Following the radiation treatment, both the experimental and control animals received only water as nourishment. Results show that gamma-irradiation induced an increase of cholesterol biosynthesis only in the liver and the mucous membranes of the small intestine.



No changes in cholesterol biosynthesis were recorded in the brain, lungs, and spleen. It is concluded that the radiation activation of the biosynthesis of cholesterol in the primary cholesterol-synthesizing organ (the liver) and in the critical organ damaged by radiation (the mucous membranes of the small intestine) can be regarded as an adaptation process directed toward the recovery of radiation-damaged cells of the mucous membranes of the small intestine. N.B.

A83-39521

**DIFFERENCES IN THE DESCRIPTION OF A VISUAL IMAGE AT THE LEVEL OF THE POSTERIOR PARIETAL AND INFEROTEMPORAL CORTICES OF MONKEYS [RAZLICHIIA V OPISANII ZRITEL'NOGO OBRAZA NA UROVNE ZADNETEMENNOI I NIZHNEVISOCNOI KORY OBEZ'IAN]**

V. V. IAKOVLEV (Akademiia Nauk SSSR, Institut Fiziologii, Leningrad, USSR) Akademii Nauk SSSR, Doklady (ISSN 0002-3264), vol. 270, no. 3, 1983, p. 754-757. In Russian. refs

A83-39935

**LIGHT AND PROPRANOLOL SUPPRESS THE NOCTURNAL ELEVATION OF SEROTONIN IN THE CEREBROSPINAL FLUID OF RHESUS MONKEYS**

N. A. GARRICK (U.S. Public Health Service, National Institute of Mental Health, Bethesda; Maryland, University, College Park, MD), L. TAMARKIN (National Institutes of Health, National Institute of Child Health and Human Development, Bethesda, MD), P. L. TAYLOR (Medical Research Council, Centre for Reproductive Biology, Edinburgh, Scotland), S. P. MARKEY, and D. L. MURPHY (U.S. Public Health Service, National Institute of Mental Health, Bethesda, MD) Science (ISSN 0036-8075), vol. 221, July 29, 1983, p. 474-476. refs

A83-39961

**THE FUNCTION OF DREAM SLEEP**

F. CRICK (Salk Institute for Biological Studies, La Jolla, CA) and G. MITCHISON (Medical Research Council, Laboratory of Molecular Biology, and Kenneth Craik Laboratory, Cambridge, England) Nature (ISSN 0028-0836), vol. 304, July 14, 1983, p. 111-114. Research supported by the J.W. Kieckhefer Foundation, Samuel Roberts Noble Foundation, and System Development Foundation. refs

(Contract AF-AFOSR-82-0042)

A theory of the function of rapid eye movement (REM) sleep is presented, noting its basis in the assumption that viviparous brains have a large network of interconnections, some of which are parasitic and may encourage aberrant behavior unless suppressed. The suppressed modes are suggested to be a manifestation of learned behavior, and the function of REM sleep is to aid in 'unlearning' the degraded behavior modes. It has been shown that information stored in the brain is in distributed, robust, and superimposed form. Instances of overloading of the super-imposition faculty can give rise to 'fantasy', 'obsession', or 'hallucination'. The series of cortical connections is modified by growth and/or experience. Inappropriate behavior resulting from the establishment of dysfunctional synaptic connections produces a set of PGO waves directed from the brain stem to the forebrain and the generation of dreams or successions of dreams as the brain seeks to purge the unwanted connections. M.S.K.

A83-39968

**LIFE SCIENCE RESEARCH ON-BOARD SPACELAB. II - EUROPEAN MULTIPURPOSE EXPERIMENTAL FACILITIES**

M. J. F. FOWLER (Royal Free Hospital School of Medicine, London, England) British Interplanetary Society, Journal (Space Chronicle) (ISSN 0007-084X), vol. 36, Aug. 1983, p. 345-350. refs

Experimental packages being developed by ESA for biological and medical research on Spacelab missions planned for 1985 and 1987 are characterized. Major areas of research are the physiological effects of weightlessness on man and on plant and animal cells and the action of space radiation on living tissues. The Biorack, containing a freezer/cooler unit, two incubators, and a glove box, will facilitate manipulation of bacterial and tissue

cultures, plants, and insects. Human vestibular function (a factor in space sickness) will be investigated using the Space Sled, which is capable of sinusoidal or constant-gravity oscillation, and associated helmetlike sensor/stimulator units. The Anthorack contains equipment for monitoring cardiovascular, sensorimotoric, and metabolic parameters. The unmanned European Retrieable Carrier (Eureca), designed to orbit at 500 km, will carry a protein-crystallization facility and a multuser botany facility for growth experiments. Data from the botany experiments will be stored on the Eureca for analysis after it is retrieved and returned to earth by the Space Shuttle. T.K.

A83-40544

**THE ROLE OF COLLATERAL CORONARY BLOOD FLOW IN THE COMPENSATION OF REGIONAL DISORDERS OF THE ENERGY METABOLISM OF HEART MUSCLE DURING EXPERIMENTAL MYOCARDIAL ISCHEMIA [O ROLI KOLLATERAL'NOGO KORONARNOGO KROVOTOKA V KOMPENSATSII REGIONARNYKH NARUSHENII ENERGETICHESKOGO OBmena SERDECHNOI MYSHTSY PRI EKSPERIMENTAL'NOI ISHEMII MIOKARDA]**

V. V. PICHUGIN and V. V. GATSURA (Kurskii Meditsinskii Institut, Kursk, USSR) Kardiologiya (ISSN 0022-9040), vol. 23, March 1983, p. 27-30. In Russian. refs

A83-40551

**STRESS-INDUCED INJURIES OF THE NONISCHEMIC REGIONS OF THE HEART IN EXPERIMENTAL INFARCTION AND THEIR PREVENTION [STRESSORNYE POVREZHDENIIA NEISHEMIZIROVANNYKH OTDELOV SERDTSА PRI EKSPERIMENTAL'NOM INFARKTE I IKH PREDUPREZHDENIE]**

F. Z. MEERSON and R. S. DOSMAGAMBETOVA (Akademiia Meditsinskikh Nauk SSSR, Moscow, USSR) Kardiologiya (ISSN 0022-9040), vol. 23, March 1983, p. 20-26. In Russian. refs

The contractile function of the region of the heart known to be unaffected by ischemia (the right atrium) was studied in rats with experimental infarcts of the left ventricle. A decrease in the tensility of the myocardial atrium, a depression in Starling's curve, and a 2 fold decrease in the maximum systolic tension, as well as a decrease in the resistance of the myocardial atrium to hypoxia and a surplus of calcium, was observed within 24 hr following the development of the infarct. This combination of changes could be fully reproduced in the absence of infarction by means of emotional and painful stress and could be prevented by iderol, a beta-adrenoreceptor blocker. It is suggested that this stress-related injury of the contractile function of the nonischemic region of the heart during infarction can be limited by factors which stabilize the lipid/bilayer membrane of cardiomyocytes. N.B.

A83-40552

**THE PROTECTIVE EFFECT OF EXTRACELLULAR K(+) IN THE MYOCARDIUM DURING DISORDERS OF ENERGY GENERATION [ZASHCHITNYI EFFEKT VNEKLETOCHNOGO K(+) V MIOKARDE PRI NARUSHENII ENERGOOBRASOVANIIA]**

V. I. KAPELKO, V. N. TITOV, N. A. NOVIKOVA, T. I. KOTKINA, and K. I. MALINOVSKAIA (Akademiia Meditsinskikh Nauk SSSR, Moscow, USSR) Kardiologiya (ISSN 0022-9040), vol. 23, March 1983, p. 14-20. In Russian. refs

The significance of the accumulation of K(+) in the intercellular spaces of the myocardium for cellular functions during disorders of energy generation was investigated in isolated hearts of guinea pigs with metabolic blocking caused by injections of dinitrophenol and a 2.2 fold reduction in the coronary flow. Results show that these conditions produced a sharp drop in the contractile function, a shorter electric systole, a decrease in the glycogen content, a displacement of the ST segment on the EKG, and a decreased amplitude of the R peak. These changes reflected the retarding of permeability and the disorders of repolarization evoked by the accumulation of K(+). An increase in the coronary perfusion rate led to a rapid increase in the rate of K(+) outflow from the heart which was proportional to the rate of hyperperfusion. A moderate increase in the concentration of K(+) was found to prevent the

development of fibrillation and also significantly reduced the degree of contracture and the decrease in glycogen during hyperperfusion. It is concluded that the accumulation of K(+) in the early period of energy generating disorders provides a protective effect by decreasing the intensity of the contractile function and the expenditure of energy. N.B.

**A83-40553**

**THE DETERMINATION OF THE VOLUME OF RAPIDLY CIRCULATING BLOOD BY A THERMAL DILUTION METHOD [OPREDELENIE OB'EMA BYSTROTTSIRKULIRUIUSHCHEI KROVI METODOM TERMORAZVEDENIIA]**

I. I. TIUTRIN, E. F. LEVITSKII, N. V. LIAN, and V. V. UDUT (Akademii Meditsinskikh Nauk SSSR, Tomsk, USSR) Patologicheskaya Fiziologiya i Eksperimental'naya Terapiya (ISSN 0031-2991), Mar.-Apr. 1983, p. 79, 80. In Russian. refs

A method is developed for determining the volume of rapidly circulating blood (VRCB), one of the most essential hemodynamic parameters, based on the principle of thermal dilution. The method consists of determining the mean time of blood circulation by means of a circulating indicator (a sodium chloride solution cooled to 1-5 C), which when multiplied by the minute volume of blood circulation gives the VRCB. The method was tested on 26 dogs using a lead with a thermal resistor which was passed through the left femoral artery. A catheter was inserted through the exterior carotid artery into the left ventricle for the introduction of the indicator. A special catheter was inserted into the right atrium for the introduction of the cooling indicator and a lead with a thermal resistor. The results of the method were compared with those obtained using the dye T-1824 by the method of Solov'ev and Radzivil (1973). It is determined that this method for measuring the VRCB is rapid, highly reproducible, and simple, although it is slightly less accurate than the method using the dye T-1824.

N.B.

**A83-40554**

**THE ROLE OF THE AFFERENT NERVE IN THE REGULATION OF THE REPAIR REGENERATION OF BONE TISSUE [ROL' REGENERATSIY NERVA V REGULIATSII REPARATIVNOI REGENERATSII KOSTNOI TKANI]**

V. F. EROSHENKO and A. I. VOLOZHIN (Moskovskii Meditsinskii Stomatologicheskii Institut, Moscow, USSR) Patologicheskaya Fiziologiya i Eksperimental'naya Terapiya (ISSN 0031-2991), Mar.-Apr. 1983, p. 45-49. In Russian. refs

The role of the afferent nerve in the mechanism of the regeneration of bone tissue was investigated by determining the pattern of the repair regeneration of the mandible following trauma in rabbits with transected inferior alveolar nerves. Deafferentation led to an inhibition of mineral metabolism and a decrease in the content of collagen in the mandible following trauma of the mandible, which indicated the inhibition of reparative osteogenesis. These changes were observed to progressively worsen up to 40 days after the trauma, and the initial values were recovered only after 60 days. In the animals without deafferentation, these values returned to their initial levels by 20 days after the trauma. It is concluded that deafferentation intensifies the formation of a fibrous bone callous which is replaced by mature bone tissue at a much slower rate than in the afferented control animals. N.B.

**A83-40555**

**THE PITUITARY GLAND AND THE RESISTANCE OF THE BODY TO EXTREME ACTIONS [EPIFIZ I REZISTENTNOST' ORGANIZMA K EKSTREMAL'NYM VOZDEISTVIAM]**

V. D. SLEPUSHKIN, E. V. SAVINA, and G. K. ZOLOEV (Akademii Meditsinskikh Nauk SSSR, Tomsk, USSR) Patologicheskaya Fiziologiya i Eksperimental'naya Terapiya (ISSN 0031-2991), Mar.-Apr. 1983, p. 15-19. In Russian. refs

The role of the pituitary gland in the formation of resistance to extreme actions and the mechanism of the effect of this gland in resistance and adaptation are investigated in studies using dogs and rats. Results of experiments with rats showed that the mortality rate due to shocks evoked by the crushing of soft tissue and acute necrosis of the cardiac muscles increased in animals which

underwent removal of the pituitary gland 4-5 days before the beginning of the experiments. The intraperitoneal injection of an extract derived from the pituitary gland was found to reduce the mortality due to traumatic shocks in dogs and rats with excised pituitary glands, and also normalized the hemodynamic parameters and metabolic values. It is concluded that one of the primary regions for the biological activity of substances secreted by the pituitary gland is the cardiovascular system, in particular the functional capability of the heart. N.B.

**A83-40556**

**THE ADRENOREACTIVITY OF THE CONTRACTILE MYOCARDIUM AND CORONARY ARTERIES IN THE CASE OF CHRONIC OVERLOAD AND ACUTE ISCHEMIC INJURIES OF THE HEART [ADRENOREAKTIVNOST' SOKRATITEL'NOGO MIOKARDA I KORONARNYKH ARTERII PRI KHRONICHESKOI PEREGRUZKE I OSTROM ISHEMICHESKOM POVREZHDENII SERDTSIA]**

IU. I. BOBKOV, T. I. PIMENOVA, T. M. FROLOVA, and N. I. SHEVLIKOVA (Tsentral'nyi Institut Usovershenstvovaniia Vrachey, Moscow, USSR) Patologicheskaya Fiziologiya i Eksperimental'naya Terapiya (ISSN 0031-2991), Mar.-Apr. 1983, p. 8-11. In Russian. refs

**A83-40561**

**THE BIOLOGICAL ROLE OF THE REACTIVE INHIBITION OF MITOSIS DURING STRESS [BIOLOGICHESKAIA ROL' REAKTIVNOGO TORMOZHENIIA MITOZOV PRI STRESSE]**

S. S. TIMOSHIN (Khabarovskii Meditsinskii Institut, Khabarovsk, USSR) Arkhiv Patologii (ISSN 0004-1955), vol. 45, no. 4, 1983, p. 83-87. In Russian. refs

The effect of five different stressors (including contact hypothermia and sublethal hyperthermia) on the processes of cell division in the corneal epithelium of rats was investigated. All five stressors evoked the development of the general adaptation syndrome in the rats according to the degree of stress. The cell division processes were evaluated and the percentages of pathological processes were determined by various methods, including autoradiography and cytophotometric analysis. It was found that during the course of the general adaptation syndrome, the G2 period was lengthened due to the enhanced secretion of adrenal hormones, which caused a decrease in the number of mitotic processes during the first few hours following the application of stress. No increase in the number of pathological mitoses was observed, and the level of DNA replication remained stable. The effect of stress on adrenalectomized rats did not lead to changes in the number of mitoses or the length of the premitotic period, although the number of pathological mitoses increased and DNA replication was altered. It is concluded that adrenal hormones are an important part of the functional system of mitosis which contributes to the maintenance of genetic stability. N.B.

**A83-40563**

**PHYSIOLOGICAL MECHANISMS OF THE REGULATION OF LIPOPROTEIN BIOSYNTHESIS IN THE LIVER DURING PHYSICAL LOADING AND IN VARIOUS PHASES OF THE RECOVERY PERIOD [FIZIOLOGICHESKIE MEKHANIZMY REGULIATSII BIOSINTEZA LIPOPROTEIDOV V PECHENI PRI FIZICHESKOI NAGRUZKE I V RAZLICHNYE FAZY VOSSTANOVITEL'NOGO PERIODA]**

N. N. MAIANSKAIA, L. E. PANIN, and L. M. POLIAKOV (Akademii Meditsinskikh Nauk SSSR, Novosibirsk, USSR) Voprosy Meditsinskoi Khimii (ISSN 0042-8809), vol. 29, Mar.-Apr. 1983, p. 73-77. In Russian. refs

A83-40564

**DISORDERS OF LIPID METABOLISM IN THE TESTES DURING EMOTION AND PAINFUL STRESS [NARUSHENIE LIPIDNOGO OBmena SEMENNIKOV PRI EMOTSIONAL'NO-BOLEVOM STRESSE]**

F. Z. MEERSON, M. I. PETUKHOV, A. F. KHODYREVA, I. V. PARAMONOVA, V. A. SOLOVEV, and L. IU GOLUBEVA (Akademiia Meditsinskikh Nauk SSSR, Moscow, USSR) *Voprosy Meditsinskoi Khimii* (ISSN 0042-8809), vol. 29, Mar.-Apr. 1983, p. 40-43. In Russian. refs

The effect of emotional and painful stress on the lipid composition and the activity of several enzymes of the glycolytic and pentose phosphate pathways in the testes was studied in rats. It is found that the action of emotional and painful stress results in the alteration of lipid metabolism in the testes of rats due to the activation of lipid peroxidation and lipolysis. These alterations of lipid metabolism may play a role in the stress-induced disorders of the excretory function of the testes. A corresponding activation of the pentose phosphate pathway was found which may be one of the factors in the restoration of the structure and function of the testes following the action of stress. N.B.

A83-40565

**THE EFFECT OF AN INSUFFICIENCY OF IODINE ON THE GROWTH AND FORMATION OF BONE TISSUE [VLIANIE NEDOSTATKA IODA NA ROST I FORMIROVANIE KOSTNOI TKANI]**

V. I. SMOLIAR (Nauchno-Issledovatel'skii Institut Gigieny Pitaniia, Kiev, Ukrainian SSR) *Voprosy Pitaniia* (ISSN 0042-8833), Mar.-Apr. 1983, p. 38-42. In Russian. refs

A83-40567

**THE EFFECT OF DECIMETER WAVES ON THE PHYSICAL AND CHEMICAL CONDITION OF MEMBRANES, THE CHROMATIN OF THYMOCYTES, AND THE IMMUNOLOGICAL REACTIVITY OF AN ORGANISM [VLIANIE DETSIMETROVYKH VOLN NA FIZIKO-KHIMICHESKOE SOSTOIANIE MEMBRAN, KHROMATINA TIMOTSITOV I IMMUNOLOGICHESKUII REAKTIVNOST' ORGANIZMA]**

Z. A. SOKOLOVA, S. M. ZUBKOVA, I. D. FRENKEL, S. B. PERSHIN, and V. M. BOGOLIUBOV (Tsentral'nyi Nauchno-Issledovatel'skii Institut Kurortologii i Fizioterapii, Moscow, USSR) *Voprosy Kurortologii, Fizioterapii i Lechebnoi Fizicheskoi Kul'tury* (ISSN 0042-8787), Mar.-Apr. 1983, p. 6-10. In Russian. refs

The various effects of decimeter waves on the structural condition of nuclear chromatin and the cytoplasmic and nuclear membranes of thymocytes, depending on their location, were studied in healthy rabbits. Results show that decimeter waves activate the genetic system of thymus cells and intensify the effects of 7-(p-methoxybenzylamino)-4-nitrobenzoxymethyl and chlorotetracycline which are connected with the membranes of the cell and the nucleus of thymocytes, during irradiation of the thyroid gland, as well as reduce these parameters during action on the projection zone of the adrenal glands and the temporal-parietal region. At the same time, corresponding changes in the proliferating processes in the lymph tissues were observed. The mechanisms of these shifts are examined. N.B.

A83-40570

**THE EFFECT OF ULTRASOUND ON THE PHYSICAL AND CHEMICAL PROPERTIES OF HYDROXYPROGESTERONE CAPRONATE (EXPERIMENTAL INVESTIGATION) [VLIANIE UL'TRAZVUKA NA FIZIKO-KHIMICHESKIE SVOISTVA OKSIPROGESTERONA KAPRONATA (EKSperimental'NOE ISSLEDOVANIE)]**

V. D. GRIGOREVA and V. V. SAPOZHNIKOV (Tsentral'nyi Nauchno-Issledovatel'skii Institut Kurortologii i Fizioterapii, Moscow, USSR) *Voprosy Kurortologii, Fizioterapii i Lechebnoi Fizicheskoi Kul'tury* (ISSN 0042-8787), Mar.-Apr. 1983, p. 33-35. In Russian.

A83-40571

**CHANGES OF THE HORMONAL SPECTRUM OF THE BLOOD UNDER THE EFFECT OF MICROWAVES IN THE CENTIMETER RANGE [IZMENENIE GORMONAL'NOGO SPEKTRA KROVI POD VLIANIE MİKROVOLN SANTIMETROVOGO DIAPAZONA]**

L. A. NIKOLAEVA and V. S. ULASHCHIK (Belorusskii Institut Usovershenstvovaniia Vrachei, Minsk, Belorussian SSR) *Voprosy Kurortologii, Fizioterapii i Lechebnoi Fizicheskoi Kul'tury* (ISSN 0042-8787), Mar.-Apr. 1983, p. 11-13. In Russian. refs

The effect of centimeter waves of various intensities on the excretory functions of the pituitary, adrenal, thyroid, and pancreatic glands were studied in experiments using rabbits. Results showed that the reactions of endocrine glands to centimeter waves are not identical, and in general these reactions depend on the intensity of the waves, the number of exposures, and the functional activity of the endocrine glands. The highest degree of sensitivity to centimeter waves was exhibited by the hypophysial-adrenal system. N.B.

A83-40573

**AN INVESTIGATION OF THE STRENGTH OF ACTION AND THE INTERACTION OF GENES DETERMINING THE DIFFERENCES IN THE STEM LENGTH OF ARABIDOPSIS THALIANA (L.) HEYNH. (THREE HYBRID CROSS) [ISSLEDOVANIE SILY DEISTVIA I VZAIMODEISTVIA GENOV, OPREDELIAIUSHCHIKH RAZLICHIIA V DLINE STEBLIA ARABIDOPSIS THALIANA (L.) HEYNH. /TRIGIBRIDNOE SKRESHCHIVANIE/]**

I. D. SOKOLOV and I. IU. VIZIR (Donetskii Gosudarstvennyi Universitet, Donetsk, Ukrainian SSR) *Tsitologiya i Genetika* (ISSN 0041-4883), vol. 17, Mar.-Apr. 1983, p. 34-39. In Russian. refs

A83-40575

**INVESTIGATIONS OF THE MICROCIRCULATORY BED OF THE BRAIN IN EXPERIMENTAL CONDITIONS. II - DISORDERS OF BLOOD FLOW FOLLOWING CRANIOCEREBRAL TRAUMA [ISSLEDOVANIE MIKROTSIRKULIATSIONNOGO RUSLA MOZGA V EKSPERIMENTE. II - NARUSHENIIA KROVOTOKA POSLE CHEREPNO-MOZGOVOI TRAVMY]**

O. V. GAEVYI, A. A. ARTARIAN, S. M. BLINKOV, and M. V. PUTSILLO (Tsentral'nyi Institut Usovershenstvovaniia Vrachei, Akademiia Meditsinskikh Nauk SSSR, Moscow, USSR) *Voprosy Neurokhirurgii* (ISSN 0042-8817), Mar.-Apr. 1983, p. 19-24. In Russian. refs

A83-40577

**COMPUTER TOMOGRAPHY FOR TUMORS OF THE POSTERIOR REGIONS OF THE THIRD VENTRICLE AND THE PINEAL BODY [KOMP'UTERNAIA TOMOGRAFIIA PRI OPUKHOIYAKH ZADNIKH OTDEL OV III ZHELUDOKHKA I SHISHKOVIDNOGO TELA]**

A. N. KONOVALOV, V. N. KORNIENKO, and E. L. KLUMBIS (Akademiia Meditsinskikh Nauk SSSR, Moscow, USSR) *Voprosy Neurokhirurgii* (ISSN 0042-8817), Mar.-Apr. 1983, p. 3-11. In Russian. refs

A83-40582

**MORPHOFUNCTIONAL CHANGES OF THE LYMPHOID TISSUE OF THE RESPIRATORY ORGANS FOLLOWING THE ADMINISTRATION OF GAMMA-GLOBULIN [MORFOFUNKTSIONAL'NYE IZMENENIIA LIMFOIDNOI TKANI ORGANOV DYKHANIIA PRI VVEDENII GAMMA-GLOBULINA]**

V. K. SYRTSOV (Zaporozhskii Meditsinskii Institut, Zaporozhe, Ukrainian SSR) *Arkhiv Anatomii, Gistologii i Embriologii* (ISSN 0004-1947), vol. 84, March 1983, p. 45-53. In Russian. refs

A83-40584

**THE BLOOD SUPPLY OF THE TRACHEA AND BRONCHI OF RATS [KROVOSNABZHENIE TRAKHEI I BRONKH OV KRYSY]**

O. G. SIURKOV and M. T. LUTSENKO (Blagoveshchenskii Meditsinskii Institut, Blagoveshchensk, USSR) *Arkhiv Anatomii, Gistologii i Embriologii* (ISSN 0004-1947), vol. 84, March 1983, p. 29-34. In Russian. refs

## 51 LIFE SCIENCES (GENERAL)

**N83-28849\*** National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.

### **METHOD FOR DETECTING COLIFORM ORGANISMS Patent**

K. NISHIOKA (Boeing Co., Palo Alto, Calif.), D. A. NIBLEY (Boeing Co., Palo Alto, Calif.), E. L. JEFFERS (Boeing Co., Palo Alto, Calif.), and R. L. BROOKS, inventors (to NASA) (Boeing Co., Palo Alto, Calif.) 31 May 1983 10 p Filed 26 Oct. 1981 Supersedes N82-12739 (20 - 03, p 0386) Sponsored by NASA (NASA-CASE-ARC-11322-1; US-PATENT-4,386,157; US-PATENT-APPL-SN-315278; US-PATENT-CLASS-435-39, US-PATENT-CLASS-435-3; US-PATENT-CLASS-435-34; US-PATENT-CLASS-435-38; US-PATENT-CLASS-435-807) Avail: US Patent and Trademark Office CSCL 06C

A method and apparatus are disclosed for determining the concentration of coliform bacteria in a sample. The sample containing the coliform bacteria is cultured in a liquid growth medium. The cultured bacteria produce hydrogen and the hydrogen is vented to a second cell containing a buffer solution in which the hydrogen dissolves. By measuring the potential change in the buffer solution caused by the hydrogen, as a function of time, the initial concentration of bacteria in the sample is determined. Alternatively, the potential change in the buffer solution can be compared with the potential change in the liquid growth medium to verify that the potential change in the liquid growth medium is produced primarily by the hydrogen gas produced by the coliform bacteria.

Official Gazette of the U.S. Patent and Trademark Office

**N83-28850#** Defence Research Information Centre, Orpington (England)

### **THE CONCENTRATION OF COBALT-60 AND STABLE COBALT IN SEDENTARY MARINE ORGANISMS**

Y. IMAZAWA, K. NAKAYAMA, J. ABUKAWA, H. FUKATSU, and H. HIGUCHI Jan. 1983 12 p refs Transl into ENGLISH from Radioisotopes (Japan), v. 31, no. 1, 1982 p 21-25 (BLL-DRIC-TRANS-6755-(3623.66)) Avail: NTIS HC A02/MF A01

The level of Cobalt 60 and stable Cobalt in shellfish and seaweeds collected along the Japanese coast in 1978 and 1979 was surveyed. Sedentary organisms such as shellfish which concentrate cobalt are valuable indicators in establishing the level of radioactivity. Explanations are given for variations in results for different organisms. Author

**N83-28851#** Defence Research Information Centre, Orpington (England).

### **THE CONCENTRATIONS OF COBALT-60 AND STABLE COBALT IN MIGRATORY MARINE ORGANISMS**

H. FUKATSU, K. NAKAYAMA, Y. IMAZAWA, J. ABUKAWA, and H. HIGUCHI Jan. 1983 12 p refs Transl. into ENGLISH from Radioisotopes (Japan), v. 31, Jan. 1982 p 16-20 (BLL-DRIC-TRANS-6754-(3623.66); BR86784) Avail: NTIS HC A02/MF A01

A survey of information on the level of cobalt-60 and other radio-nuclides in marine organisms inhabiting Japanese inshore waters is described. Large scale nuclear tests at Bikini Atoll in the 1960s are thought to be the source of these radionuclides. This is confirmed by the relation observed between cobalt-60 and stable cobalt in migratory organisms such as squid S.L.

**N83-28852\*#** National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.

### **ELECTRON TRANSPORT IN PARACOCCLUS HALODENITRIFICANS AND THE ROLE OF UBIQUINONE**

L. I. HOCHSTEIN and S. E. CRONIN Jun. 1983 23 p refs (NASA-TM-84382; A-9269; NAS 1.15:84382) Avail: NTIS HC A02/MF A01 CSCL 06C

The membrane-bound NADH oxidase of *Paracoccus halodenitrificans* was inhibited by dicoumarol, 2-n-heptyl-4-hydroxyquinoline-N-oxide (HQNO), and exposure to ultraviolet light (at 366 nm). When the membranes were extracted with n-pentane, NADH oxidase activity was lost. Partial restoration was achieved by adding the ubiquinone fraction extracted from

the membranes. Succinate oxidation was not inhibited by dicoumarol or HQNO but was affected by ultraviolet irradiation or n-pentane extraction. However, the addition of the ubiquinone fraction to the n-pentane-extracted membranes did not restore enzyme activity. These observations suggested the reducing equivalents from succinate entered the respiratory chain on the oxygen side of the HQNO-sensitive site and probably did not proceed through a quinone. Author

**N83-28853#** Los Alamos Scientific Lab., N. Mex.

### **PROBLEMS AND PROSPECTS IN FUTURE APPLICATIONS OF STABLE ISOTOPES IN THE LIFE SCIENCES AND MEDICINE**

C. J. UNKEFER and T. E. WALKER 1982 13 p refs Presented at Synthesis and Appl. of Isotopically Labeled Compounds, Kansas City, Mo., 6-11 Jun. 1982 (DE82-017358, LA-UR-82-1860; CONF-820666-2) Avail: NTIS HC A02/MF A01

The use of stable isotopes of carbon, oxygen, and nitrogen in the life sciences and medicine fueled by the increased availability of the isotopes and isotopically labeled compounds and of instruments for their detection is discussed. Accelerated development of <sup>13</sup>C, <sup>15</sup>N, and <sup>17</sup>O is expected in the future to study drug bioavailability, nutrition and body protein economy, viability of organs for transplant, and for noninvasive tests of metabolic diseases and dysfunctions. These accelerated developments depend on continued improvements in nmr and ms instrumentation and in methods for the synthesis of isotopically labeled compounds. The possibilities of biosynthesis for the selective enrichment of natural products, especially amino acids, with <sup>13</sup>C are explored. DOE

**N83-28854#** Nebraska Univ., Lincoln.

### **BIOCHEMICAL AND PHYSIOLOGICAL CHARACTERIZATION OF HIGHER PLANTS WITH REDUCED PHOTORESPIRATION Progress Report, 25 Mar. 1981 - 1 Mar. 1982**

R. CHOLLET 1982 4 p refs (Contract DE-AC02-81ER-10902) (DE82-009556; DOE/ER-10902/1) Avail: NTIS HC A02/MF A01

Research progress is reported in the following areas: (1) the possibility that reduced photo-respiration in the crucifer *Morandia arvensis* is due to a limited C4-photosynthesis system similar to that in the C3-C4 intermediate *Panicum milioides* was critically evaluated; and (2) the reported effects of ploidy on the kinetic and structural properties of RuBPCase isolated from various diploid and tetraploid cultivars of perennial ryegrass were evaluated. DOE

**N83-28855#** Stichting Mathematisch Centrum, Amsterdam (Netherlands) Dept. of Applied Mathematics.

### **AN EIGENVALUE PROBLEM RELATED TO CELL GROWTH**

H. J. A. M. HEIJMANS Nov. 1982 35 p refs Submitted for publication (MC-TW-229/82) Avail: NTIS HC A03/MF A01

The eigenvalues of the operator corresponding to the partial differential equation, which describes the evolution of a population reproducing by simple fission, are investigated. The eigenvalue problem is transformed to an integral equation. The theory concerning positive operators on a Banach space is shown to be useful in tackling the transformation. Author (ESA)

**N83-28856#** Municipal Environmental Research Lab., Cincinnati, Ohio.

### **CHARACTERIZATION OF UNCLASSIFIED NONFERMENTATIVE GRAM NEGATIVE BACTERIA IN DRINKING WATER**

D. F. SPINO 1983 27 p refs (PB83-152165; EPA-600/D-83-003) Avail: NTIS HC A03/MF A01 CSCL 06M

The group of bacteria most frequently encountered in water distribution systems consists of nonfermentative gram negative rods. Only a small percentage of these bacteria are identifiable using commercially prepared kits or other identification keys because many isolates fail to grow in conventional media used

for biochemical characterization Modified base media were developed and used with specific substrates to detect enzymatic activity. The use of the modified base media combined with a lower incubation temperature allowed expression of increased enzymatic activity by many of the organisms. Although this permitted the characterization of the majority of these organisms, exact identification was unsuccessful since these organisms do not fit descriptions of known species found in current taxonomic schema. GRA

**N83-29967#** North Carolina Biotechnology Center, Research Triangle Park.

**BIOTECHNOLOGY: THE FORGING OF MULTIDISCIPLINARY STRATEGIES FOR RESEARCH IN BIOMOLECULAR ELECTRONICS, MATERIALS SCIENCES AND MICROECOLOGY Final Report, 31 Oct. 1982 - 30 Oct. 1983**

Dec. 1982 126 p

(Contract N00014-83-G-0010)

(AD-A125799) Avail. NTIS HC A07/MF A01 CSCL 06B

The North Carolina Biotechnology Center conducted a series of three workshops on the general theme, 'Biotechnology: The Forging of Multidisciplinary Strategies for Research' The workshops were designed to cover areas of common interest to the Navy and North Carolina scientists and engineers. Each workshop explored the opportunities presented by the merging of biotechnology into a particular area: these three areas were (1) Biomolecular Electronics, (2) Materials, Sciences, and (3) Microecology. The series of workshops had two main objectives: (1) To discover, through experimenting with this strategy, the best approach for melding the perspectives of biologists, chemists, physicists, and engineers into a cohesive whole, and (2) To develop outlines for feasible interdisciplinary research programs GRA

**N83-29968#** Michigan State Univ., East Lansing. Dept. of Biomechanics.

**MECHANICAL PROPERTIES OF THE SPINAL LIGAMENTS OF PRIMATES. PART 1: CYCLIC LOADING. PART 2: MATHEMATICAL MODELING Final Report**

R. W. LITTLE, R. P. HUBBARD, and A. R. SLONIM Wright-Patterson AFB, Ohio AFAMRL Feb. 1983 43 p refs (Contract F33615-79-C-0514; AF PROJ. 7231)

(AD-A125540; AFAMRL-TR-83-0005) Avail. NTIS HC A03/MF A01 CSCL 06S

This report is composed of two parts covering the response of spinal ligaments to cyclic creep and a mathematical model of those ligaments to a specified strain history. Four ligaments of the spine of rhesus monkey and baboon were selected for testing with test samples taken at different vertebral levels. The cyclic creep tests on ligaments from three rhesus monkeys and two baboons were preceded by single extension failure tests on ligaments from two rhesus monkeys to establish a range of static failure. In Part 2, a mathematical constitutive equation was developed using a linear viscoelastic model for individual fibers and a distribution function to include the effects of fiber distribution, orientation and initial length. Material constants and the distribution function were determined by numerical solution of the constitutive integral equation using the fastest strain rate data. Analytical and experimental results were compared for selected human spinal ligament samples. This research completes an initial investigation of the mechanical properties of spinal ligaments from the lower extremities. Research of this nature is necessary to understand the mechanism of injuries in aircrewmen that result from exposure to vibratory loading environments and high stress or strain rates during escape and crash episodes. GRA

**N83-29969#** Dayton Univ., Ohio.

**SOME VIBRATION DATA ON PRIMATES IMPLANTED WITH ACCELEROMETERS ON THE UPPER AND LOWER SPINE: METHODOLOGY AND RESULTS IN RHESUS MONKEYS**

A. R. SLONIM Wright-Patterson AFB, Ohio AFAMRL Feb. 1983 85 p refs

(Contract F33615-79-C-0509; AF PROJ. 7231)

(AD-A125545; AFAMRL-TR-81-153) Avail. NTIS HC A05/MF A01 CSCL 06S

A technique was developed to measure on a daily basis the impedance and transmissibility response in primates subjected to low frequency, sinusoidal vertical vibrations. The technique involved the surgical implantation of two accelerometers on the spinous processes of monkeys at the upper thoracic and lower lumbar levels, respectively. Four Rhesus monkeys were exposed to sinusoidal vibration from 4 to 50 Hz at 0.25 and 0.40 peak Gz acceleration levels, respectively. The impedance and transmissibility responses were linear over this narrow acceleration range, although the tendency towards non-linearity existed with all four monkeys individually or as a group. Impedance magnitude, impedance phase and transmissibility between seat and spinal accelerometers were discussed in terms of the reproducibility of the data and variability within the same animal and between animals. The various factors that could contribute to the intraindividual and interindividual variabilities as well as suggestions to establish standards in methodology were presented. The application of the impedance magnitude, phase angle and transmissibility data to interspecies scaling and validation of biodynamic models was discussed briefly. Author (GRA)

**N83-29970#** Alabama Univ., University. Dept. of Biology.

**EFFECTS OF URANIUM OXIDES ON SOME OF THE ALGAE NATIVE TO EGLIN AIR FORCE BASE, FLORIDA Final Report, Feb. 1977 - Sep. 1979**

T. R. DEASON Eglin AFB, Fla. AFATL Jun. 1982 92 p refs

(Contract F08635-77-C-0047; AF PROJ. 06AL)

(AD-A125478; AFATL-TR-82-40) Avail. NTIS HC A05/MF A01 CSCL 08A

Population studies were made for algae collected from creeks on the Eglin Air Force Base reservation in Northwest Florida. Cultures of several of the algal species found in the creeks were isolated and exposed to various concentrations of UO<sub>2</sub> and U3O<sub>8</sub> to determine how the algae responded, how much uranium they took up, and what uptake mechanism was involved. Factors related to mobility of uranium on the reservation are discussed. Author (GRA)

**N83-29971#** Letterman Army Inst. of Research, San Francisco, Calif. Div. of Combat Casualty Care.

**DOMESTIC SWINE IN PHYSIOLOGICAL RESEARCH. PART 4: A BLOOD ACID-BASE CURVE NOMOGRAM FOR IMMATURE PIGS Interim Report, Jun. - Dec. 1982**

J. P. HANNON Feb. 1983 36 p refs

(Contract DA PROJ. 3M1-61102-BS-10)

(AD-A126081; LAIR-137) Avail. NTIS HC A03/MF A01 CSCL 06P

The normal acid-base characteristics of porcine blood have been poorly defined, largely because of procedural differences in animal handling, blood sampling, and measurement techniques. Consequently, 40 immature, 20- to 31 kg domestic pigs were used to establish population characteristics for arterial blood. Samples were collected from chronically implanted catheters while the animals were maintained under steady state, near-basal conditions. Hourly measurements over a 6-hour period in 6 of these pigs showed a small but significant decrease in P<sub>O2</sub>, with time but no significant change in acid-base status. The data showed that nomograms or other procedures based on human blood characteristics were invalid when used to estimate base excess concentration of porcine blood. The normal pH of arterial blood was higher in pigs than in humans; hence, parameters defining zero base excess differed in the two species. Consequently, constant P<sub>CO2</sub> titrations were performed on arterial samples taken



from 10 pigs and the data were used to construct an acid-base curve nomogram in which zero base excess was defined for blood with a pH of 7.50 and a P CO<sub>2</sub> of 40 torr. GRA

**N83-29972#** Nebraska Univ., Lincoln.  
**BIOCHEMICAL AND PHYSIOLOGICAL CHARACTERIZATION OF HIGHER PLANTS WITH REDUCED PHOTORESPIRATION Progress Report, 1 Mar. 1982 - 1 Mar. 1983**

R. CHOLLET 1983 5 p refs  
 (Contract DE-AC02-81ER-10902)  
 (DE83-007949; DOE/ER-10902/2) Avail: NTIS HC A02/MF A01

Progress is reported in the following research areas: (1) photosynthetic carbon metabolism in naturally occurring higher plants with reduced photorespiration; and (2) physicochemical analysis of higher plant and bacterial ribulosebiphosphate carboxylase/oxygenase (RuBisCO). DOE

**N83-29973#** Joint Publications Research Service, Arlington, Va.  
**USSR REPORT: LIFE SCIENCES. EFFECTS OF NONIONIZING ELECTROMAGNETIC RADIATION, NO. 10**

23 Jun. 1983 74 p refs Transl. into ENGLISH from various Russian articles  
 (JPRS-83745) Avail: NTIS HC A04

Several areas of life science are addressed including the effects of microwave electromagnetic energy, use of magnet in medical treatment, morphological changes in neurons, hepatic circulation, brain and liver metabolism, and oxidative phosphorylation of organ mitochondria.

**N83-29974#** Joint Publications Research Service, Arlington, Va.  
**AUTOALLERGIC EFFECTS OF MICROWAVE ELECTROMAGNETIC ENERGY AND THEIR INFLUENCE ON THE FETUS AND OFFSPRING**

M. G. SHANDALA and G. I. VINOGRADOV *In its* USSR Rept.: Life Sci. Effects of Nonionizing Electromagnetic Radiation, No. 10 (JPRS-83745) p 1-4 23 Jun. 1983 refs Transl. into ENGLISH from Vestn. Akad. Med. Nauk SSSR (USSR), no. 10, Oct. 1982 p 13-16  
 Avail: NTIS HC A04

Wide use of microwave generators, the increasing number of people subjected to the effects of microwaves, and the difficulties of protection against the effects of powerful antenna fields of radar stations have brought the problem of the biological effects of microwaves to the forefront. The effects of autoimmune processes occurring in the organism of a pregnant female animal on the development of the fetus and the offspring when it is irradiated by microwave energy were investigated. Author

**N83-29975#** Joint Publications Research Service, Arlington, Va.  
**EFFECT OF LOW-INTENSITY SUPERHIGH-FREQUENCY ENERGY ON RESPIRATION AND OXIDATIVE PHOSPHORYLATION OF ORGAN MITOCHONDRIA AND ACTIVITY OF SOME BLOOD ENZYMES**

M. I. RUDNEV, N. Y. TARASYUK, and A. D. KULIKOVA *In its* USSR Rept.: Life Sci. Effects of Nonionizing Electromagnetic Radiation, No. 10 (JPRS-83745) p 5-8 23 Jun. 1983 refs Transl. into ENGLISH from Vrach. Delo (USSR), no. 11, Nov. 1982 p 93-95  
 Avail: NTIS HC A04

Electromagnetic fields in the superhigh frequency range (SHF) have considerable penetration capacity and affect various organs and functions of the body. A change in morphology and biochemical functions of mitochondria could serve as a sensitive indicator of the state of a cell and its reactions to diverse environmental agents, including SHF fields. Superhigh frequency energy delivered to the organism elicits changes in respiration and oxidative phosphorylation of liver mitochondria, and lowers the activity of several enzymatic systems. Author

**N83-29976#** Joint Publications Research Service, Arlington, Va.  
**PROBLEMS OF STUDYING THE BIOLOGICAL EFFECT OF ELECTROMAGNETIC FIELDS DISCUSSED**

I. N. GORBACH and B. A. LUCHEVSKIY *In its* USSR Rept.: Life Sci. Effects of Nonionizing Electromagnetic Radiation, No. 10 (JPRS-83745) p 9-13 23 Jun. 1983 refs Transl. into ENGLISH from Zdravookh. Beloruss. (USSR), no. 2, Feb. 1983 p 30-32

Avail: NTIS HC A04

The problem of the biological effect of electromagnetic fields (EMF) is extremely pressing. Its significance and urgency are growing as time goes on. Successful resolution of this problem is only possible as a result of integrated research both in the field of direct EMF radiation on humans and animals, and theoretical research involving a broad group of specialists. The primary focus should be on developing a united methodological approach to planning and conducting research. Author

**N83-29977#** Joint Publications Research Service, Arlington, Va.  
**EFFECT OF CORDIAMINE AND MESATONE ON ECG UNDER CONDITIONS OF ACUTE MICROWAVE IRRADIATION**

V. M. KOLDAYEV *In its* USSR Rept.: Life Sci. Effects of Nonionizing Electromagnetic Radiation, No. 10 (JPRS-83745) p 14-18 23 Jun. 1983 refs Transl. into ENGLISH from Farmakol. Toksikol. (USSR), v. 45, no. 5, Sep - Oct. 1982 p 57-59  
 Avail: NTIS HC A04

Acute microwave irradiation of animals causes a disturbance in cardiac which is one of the causes of their death. It is well known that some analeptics and adrenomimetic substances increase the survival rate of animals irradiated with microwaves. However, the effect of the indicated agents on the heart under conditions of acute microwave irradiation was not studied earlier. The effect of cordiamine and mesatone on the ECG of mice after acute microwave irradiation in various doses was investigated in this work. Author

**N83-29978#** Joint Publications Research Service, Arlington, Va.  
**LOCAL USE OF MICROWAVE ELECTROMAGNETIC ENERGY ON BIOLOGICALLY ACTIVE POINTS**

Y. Y. VAGIN and V. A. SHESTIPEROV *In its* USSR Rept.: Life Sci. Effects of Nonionizing Electromagnetic Radiation, No. 10 (JPRS-83745) p 19-23 23 Jun. 1983 refs Transl. into ENGLISH from Biol. Nauki (USSR), no. 1, Jan. 1983 p 40-43  
 Avail: NTIS HC A04

Use of superhigh frequency electromagnetic energy to stimulate biologically active points makes it possible to pinpoint emission of electromagnetic field energy in the region of the points. Exposure to a field at a frequency of 2375 MHz and intensity that elicits heating of active point tissues produces reflex changes in somatovegetative parameters of animals. The demonstrated changes are mild and reversible. Author

**N83-29979#** Joint Publications Research Service, Arlington, Va.  
**INFLUENCE OF PROLONGED ILLUMINATION OF THE RABBIT RETINA BY MONOCHROMATIC LIGHT ON ITS FUNCTIONAL STATE**

A. B. BUTMAN and O. A. MASLAKOV *In its* USSR Rept.: Life Sci. Effects of Nonionizing Electromagnetic Radiation, No. 10 (JPRS-83745) p 24-28 23 Jun. 1983 refs Transl. into ENGLISH from Gig. Tr. i Prof. Zabol. (USSR), no. 1, Jan. 1983 p 38-40  
 Avail: NTIS HC A04

Prolonged (45 minute) multiple diffuse exposure of the rabbit retina to monochromatic radiation in the bluegreen portion of the spectrum at power densities significantly below the thresholds of changes in the fundus oculi can lead to pronounced, stable inhibition of the functional state of the visual analyzer's peripheral division. The most pronounced inhibition of the amplitude of the electroretinogram (ERG) b wave recorded from the rabbit eye (an average of 60 percent in comparison with the initial level) was observed following a relatively lengthy period after exposure (60-90 days). Inhibition of the ERG was also recorded for the opposite, nonirradiated eye (by as much as 30 percent) in this case. It

would be suitable to turn attention to changes in the functional state of the visual analyzer when considering hygienic standards for prolonged multiple laser irradiation. Author

**N83-29980#** Joint Publications Research Service, Arlington, Va.  
**DEPENDENCE OF BIOLOGICAL EFFECTS OF MICROWAVE IRRADIATION ON EXPOSURE INTENSITY AND DURATION**

Y. A. LOBANOVA, I. P. SOKOLOVA, I. A. KITSOVSKAYA, N. B. RUBTSOVA, and Y. K. LEBED *In its* USSR Rept.: Life Sci. Effects of Nonionizing Electromagnetic Radiation, No. 10 (JPRS-83745) p. 29-36. 23 Jun. 1983. refs. Transl. into ENGLISH from Gig. Tr. i Prof. Zabal (USSR), no. 1, Jan. 1983. p. 30-35.

Avail: NTIS HC A04

The objective of the work was to study the relationship between the biological effect and the intensity and duration of microwave exposure. Published data on this question are extremely meager, and they pertain to studies performed at high radiation levels accompanied by thermal effects. The results of these studies indicate that at radiation levels producing thermal effects, a nonlinear dependence exists between the biological effect and irradiation intensity. The biological effectiveness of nine different modes of exposure to microwaves in the 10 centimeter range with power flux densities (PFD) from 0.25 to 10 mw/square cm and an exposure time from 25 to 240 minutes, using indicators characterizing the functional state of the central nervous system and the neuroendocrine system, immunological reactivity and embryogenesis was evaluated. Total irradiation time varied from 3 weeks to 4.5 months. The dependence between the biological effect and exposure intensity and duration was determined in relation to identical temporal, power and energy characteristics of irradiation. Author

**N83-29981#** Joint Publications Research Service, Arlington, Va.  
**METABOLISM OF THE BRAIN AND LIVER AFTER EXPERIMENTAL EXPOSURE TO SUPER HIGH-FREQUENCY FIELDS OF NON-THERMAL INTENSITY**

V. S. BELOKRINITSKIY and L. A. TOMASHEVSKAYA *In its* USSR Rept.: Life Sci. Effects of Nonionizing Electromagnetic Radiation, No. 10 (JPRS-83745) p. 37-40. 23 Jun. 1983. Transl. into ENGLISH from Vrach. Delo (USSR), no. 10, Oct. 1982. p. 115-118.

Avail: NTIS HC A04

One of the main biological effects of electromagnetic waves is their influence on the functional state of the brain, which itself immediately and directly involves the disruption of other functions. The intensity of the electromagnetic waves and the initial condition of the organism determine both the degree of the changes that occur and the ability to develop compensatory-adaptive reactions based on metabolic processes. Since the disruption of energy exchange plays the role of a triggering mechanism in the development of subsequent metabolic and functional disorders, special attention has been focused on studying the activity of enzymes which catalyze processes of energy formation, and processes of oxidative phosphorylation and glycolysis. B.W.

**N83-29982#** Joint Publications Research Service, Arlington, Va.  
**STATE OF HEPATIC CIRCULATION IN RESPONSE TO COMBINED EFFECT OF LEAD AND ELECTROMAGNETIC FIELDS**

M. S. TRINOS and Y. A. ODERIY *In its* USSR Rept.: Life Sci. Effects of Nonionizing Electromagnetic Radiation, No. 10 (JPRS-83745) p. 41-44. 23 Jun. 1983. refs. Transl. into ENGLISH from Vrach. Delo (USSR), no. 8, Aug. 1982. p. 109-111. Previously announced as 83A-17159.

Avail: NTIS HC A04

In recent years the national economy has been making broad use of the energy of radio frequencies combined with other factors of the production environment. In some production operations lead vapor can be detected in the air around workplaces in addition to electromagnetic fields of nonthermogenic intensity (in radio engineering industry and elsewhere). One of the most sensitive indicators of the effect of superhigh-frequency electromagnetic

fields and lead vapor is the state of regional hemodynamics. Hepatic circulation was evaluated using radioisotope diagnosis and rheohepatography (RHG). The latter method has enjoyed extensive application in connection with the ease with which it could be used outside the hospital, and its adequacy to solving the posed problems. Matveykov and Pshonnik and Shershnev describe changes in the RHG in response to different diseases of the liver and bile ducts, and they point out that this method can be used to determine the state of hepatic blood flow. B.W.

**N83-29983#** Joint Publications Research Service, Arlington, Va.  
**MORPHOLOGICAL CHANGES IN NEURONS OF THE CENTRAL NERVOUS SYSTEM IN RESPONSE TO EXPERIMENTAL INFLUENCE OF CENTIMETER-RANGE ELECTROMAGNETIC WAVES ON THE BODY**

V. S. BELOKRINITSKIY *In its* USSR Rept.: Life Sci. Effects of Nonionizing Electromagnetic Radiation, No. 10 (JPRS-83745) p. 45-50. 23 Jun. 1983. refs. Transl. into ENGLISH from Vrach. Delo (USSR), no. 8, Aug. 1982. p. 105-109.

Avail: NTIS HC A04

The purpose of this work was to make morphological studies of the central nervous system following exposure of the body to electromagnetic waves, and to tie the structural changes in with published clinical physiological data on the action of this factor in man's environment. To reach this objective an experiment was conducted on animals (dogs, cats) that were exposed to electromagnetic waves, and then we studied the dynamics of the morphological state of the central nervous system during development of the process. The brain and spinal cord were studied for this purpose on the 1st, 10th, 20th and 30th days after irradiation. B.W.

**N83-29984#** Joint Publications Research Service, Arlington, Va.  
**ACTION OF INDUSTRIAL FREQUENCY ELECTRIC FIELD ON INDICATORS OF NATURAL IMMUNITY**

S. A. LYUBCHENKO *In its* USSR Rept.: Life Sci. Effects of Nonionizing Electromagnetic Radiation, No. 10 (JPRS-83745) p. 51-54. 23 Jun. 1983. refs. Transl. into ENGLISH from Vrach. Delo (USSR), no. 8, Aug. 1982. p. 103-105.

Avail: NTIS HC A04

This work represents part of a multifaceted experimental study of animals and of observations of volunteers made by the Kiev Scientific Research Institute of General and Communal Hygiene with the purpose of studying the influence of industrial frequency electromagnetic energy on the immunological system. Almost around the clock (22 hour) exposure of rabbits (two groups of six animals each weighing 2-2.5 kg) to an industrial frequency EMF in a chronic experiment (lasting 2 months) revealed significant changes in the results for an experimental group subjected to a 1,000 v/m industrial EMF in comparison with a control group. These changes pertained to the titers of beta-lysine and lysozyme and the general bactericidal potency of blood serum, determined by commonly accepted techniques. B.W.

**N83-29985#** Joint Publications Research Service, Arlington, Va.  
**EFFECT OF INDUSTRIAL FREQUENCY ELECTRIC FIELD (50 HZ) ON METABOLISM OF COPPER, IRON AND METALLOENZYMES BOUND TO THEM (EXPERIMENTAL RESEARCH)**

I. I. SHVAYKO and I. P. KOZYARIN *In its* USSR Rept.: Life Sci. Effects of Nonionizing Electromagnetic Radiation, No. 10 (JPRS-83745) p. 55-60. 23 Jun. 1983. refs. Transl. into ENGLISH from Gig. Sanit. (USSR), no. 1, Jan. 1983. p. 89-92.

Avail: NTIS HC A04

In the search for the limiting indicators to be used in such standardization. Experiments were conducted with the purpose of studying the balance and interorgan distribution of elements playing the most important role in hemopoiesis--copper and iron, and the activity of metalloproteins bound with these metals--ceruloplasmin and transferrin. The research was conducted on white male rats distributed into four groups of 15 animals each depending on the intensity of a 50 Hz (industrial frequency) electric field. Animals in group 1 served as the control, while rats in groups 2, 3 and 4

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were exposed to industrial frequency electric fields with intensities of 7, 12 and 15 kv/m respectively for 30 minutes daily over a period of 4 months. Animals to be irradiated were placed between the electrodes of a field generating unit. Fields of the required intensities were created by high voltage oil transformers. B.W.

**N83-30021\*#** Purdue Univ., Lafayette, Ind.  
**DEVELOPMENT OF SELECTION CRITERIA AND THEIR APPLICATION IN EVALUATION OF CELSS CANDIDATE SPECIES**

J. E. HOFF, J. M. HOWE, and C. A. MITCHELL /in NASA. Ames Research Center Controlled Ecol. Life Support System p 18-20 Dec. 1982

Avail: NTIS HC A05/MF A01 CSCL 06F

A total of 21 criteria were considered; nine of them fall into the realm of human nutrition and convenience (the 'use' criteria), and the remaining 12 are predominantly cultural considerations. Five criteria were considered to be of great importance in the selection of plant species and were given double weight relative to the remaining criteria. 'Use' criteria include the following: energy concentration, nutritional composition, palatability, serving size and frequency, processing requirements, use flexibility, toxicity, and human experience. 'Cultural' criteria include the following: proportion of edible biomass, yield of edible plant biomass, continuous vs. determinate harvestability, growth habit and morphology, environmental tolerance, photoperiodic and temperature requirements, symbiotic requirements and restrictions, carbon dioxide-light intensity response, suitability for soilless culture, disease resistance, familiarity with species, and pollination and propagation. A total of 115 species were evaluated and scored according to suitability for a CELSS. Author

**N83-30022\*#** Purdue Univ., Lafayette, Ind. Dept. of Horticulture.

**CANDIDATE SPECIES SELECTION: CULTURAL AND PHOTOSYNTHETIC ASPECTS**

C. A. MITCHELL /in NASA. Ames Research Center Controlled Ecol. Life Support System p 21-22 Dec. 1982

Avail: NTIS HC A05/MF A01 CSCL 06C

Cultural information is provided for a data base that will be used to select candidate crop species for a controlled ecological life support system (CELSS). Lists of food crops which will satisfy most nutritional requirements of humans and also fit within the scope of cultural restrictions that logically would apply to a closed, regenerating system were generated. Cultural and environmental conditions that will allow the most rapid production of edible biomass from candidate species in the shortest possible time are identified. Cultivars which are most productive in terms of edible biomass production by (CE) conditions, and which respond to the ever-closed approach to optimization realized by each shortened production cycle are selected. The experimental approach with lettuce was to grow the crop hydroponically in a growth chamber and to manipulate such variables as light level and duration, day/night temperature, and nutrient form and level in the solution culture. Author

**N83-30023\*#** Wisconsin Univ., Madison. Dept. of Horticulture.  
**CANDIDATE SPECIES SELECTION AND CONTROLLED ENVIRONMENT INJURIES**

T. W. TIBBITTS /in NASA. Ames Research Center Controlled Ecol. Life Support System p 23 Dec. 1982

Avail: NTIS HC A05/MF A01 CSCL 06C

Research was undertaken to attempt to identify the causal agents for intumescences that develop on many different species of plants in controlled environments. Concentration and filtration procedures were not successful in identifying any particular compounds. The injury was found to develop, even though the atmosphere for the plants is filtered through activated charcoal, potassium permanganate, or is subjected to catalytic combustion at 450 C. Thus, the causal agent is apparently either an oxidized compound or specific element, or the result of some unrecognized variation in physical conditions around the plants. The research has demonstrated that the injury is controlled to a significant extent

by temperature. Growing temperatures of 20 degrees and 25 degrees C resulted in serious injury on plants, but temperatures of 30 C resulted in very little injury. Author

**N83-30024\*#** Utah State Univ., Logan. Dept. of Plant Science  
**STUDIES ON MAXIMUM YIELD OF WHEAT AND OTHER SMALL GRAINS IN CONTROLLED ENVIRONMENTS**

F. B. SALISBURY, R. S. ALBRECHTSEN, W. F. CAMPBELL, and W. G. DEWEY /in NASA. Ames Research Center Controlled Ecol. Life Support System p 24-25 Dec. 1982

Avail: NTIS HC A05/MF A01 CSCL 06C

Maximum yield of wheat and perhaps other small grains under controlled environmental conditions; cultivars, photosynthesis, nutrient levels, and humidity and plant water potential; promoting grain maturation; cross gradient chamber design, and single celled clonal multiplication of wheat plants are outlined. Author

**N83-30025\*#** California Univ., Davis. Plant Growth Lab.  
**SELECTION OF CROP VARIETIES FOR EFFICIENT PRODUCTION USING UREA, AMMONIA, NITRITE, AND NITRATE IN CELLS**

R. C. HUFFAKER /in NASA. Ames Research Center Controlled Ecol. Life Support System p 26-28 Dec. 1982

Avail: NTIS HC A05/MF A01 CSCL 06C

The presence of NO<sub>2</sub>(-) in the external solution increased the overall efficiency of the mixed N sources by cereal leaves. The NH<sub>4</sub>(+) in the substrate solution decreased the efficiency of NO<sub>3</sub>(-) reduction, while NO<sub>3</sub>(-) in the substrate solution increased the efficiency of NH<sub>4</sub>(+) assimilation. Author

**N83-30026\*#** North Carolina State Univ., Raleigh. Dept. of Soil Science.

**PLANT GROWTH IN CONTROLLED ENVIRONMENTS IN RESPONSE TO CHARACTERISTICS OF NUTRIENT SOLUTIONS**

C. D. RAPER, JR. /in NASA. Ames Research Center Controlled Ecol. Life Support System p 29-32 Dec. 1982

Avail: NTIS HC A05/MF A01 CSCL 06C

Emphasis was given to environmental factors that alter the flux of carbohydrate from the shoot to the root system to support the absorption of nitrogen and the subsequent interaction between nitrogen uptake and whole plant growth. Only the nitrate form of nitrogen was utilized in order to establish base line responses for evaluation of future studies utilizing both ammonium and nitrate

Author

**N83-30027\*#** Massachusetts Inst. of Tech., Cambridge. Dept. of Chemical Engineering.

**TO PRODUCE NUTRIENTS FOR PLANT GROWTH**

M. MODEL, H. MIESSNER, M. KAREL, J. CARDEN, and S. LEWIS /in NASA. Ames Research Center Controlled Ecol. Life Support System p 33 Dec. 1982 Prepared in cooperation with Georgia Inst. of Tech., Atlanta

Avail: NTIS HC A05/MF A01 CSCL 06C

Homogeneous samples of freeze dried human feces and urine were prepared to assure comparability of results among various CELSS waste treatment research groups. A model of food processing wastes within a PCELSS was developed, and an initial batch of waste was prepared. An automated gas chromatographic system to analyze oxidizer effluents was designed and is operational. A state of the art quantitative elemental analysis capability, built around inductively coupled plasma emission spectroscopy and atomic absorption spectroscopy using electrothermal atomization, was demonstrated. A continuous flow wet oxidation system was constructed and is now operational. Potentially useful salt separation phenomena was observed.

Author

## AEROSPACE MEDICINE

Includes physiological factors; biological effects of radiation; and weightlessness

A83-36995

**HEMODYNAMIC RESPONSES DURING PROLONGED SITTING**  
E. SHVARTZ, J. G. GAUME, R. T. WHITE, and R. C. REIBOLD (Douglas Aircraft Co., Long Beach, CA) *Journal of Applied Physiology: Respiratory, Environmental and Exercise Physiology* (ISSN 0161-7567), vol. 54, June 1983, p. 1673-1680. refs

The hemodynamic responses during 5 hr of quiet sitting and the effect of a previous posture on these responses were investigated in human subjects by noninvasive methods using electrical impedance plethysmography. Eight young males (group A) underwent 5 hr of quiet sitting, preceded by 30 min of recumbency, 20 min of standing, and 20 sec of walking; and five other young males (group B) underwent 70 min of sitting, preceded by recumbency only. It was found that group A showed more calf blood pooling and a decrease in thigh blood flow during sitting in comparison with the control group, but after 1 hr of sitting the hemodynamic responses of the two groups were similar. Sitting for 5 hr was found to result in an increase in calf venous pooling (17 percent) and a decrease in calf blood flow (13 percent), a reduction in gravitational pooling in the thigh (corresponding to increased pooling in the calf), increases in diastolic and mean arterial pressures, and minor changes in heart rate, stroke volume, and cardiac output. It is concluded that prolonged sitting constitutes a well-compensated hemodynamic condition where increases in peripheral resistance and blood pressure correspond with calf pooling. N.B.

A83-36996

**EXPIRATORY AND ARTERIAL PARTIAL PRESSURE RELATIONS UNDER DIFFERENT VENTILATION-PERFUSION CONDITIONS**

A. ZWART, S. C. M. LUIJENDIJK, and W. R. DE VRIES (Centrale Organisatie voor Toegepast-Natuurwetenschappelijk Onderzoek, Medisch-Fysisch Instituut, TNO; Utrecht, Rijksuniversiteit, Utrecht, Netherlands) *Journal of Applied Physiology: Respiratory, Environmental and Exercise Physiology* (ISSN 0161-7567), vol. 54, June 1983, p. 1745-1753. refs

Inert tracer gas exchange across the human respiratory system was studied in an asymmetric lung model for different oscillatory breathing patterns. The momentary volume-averaged alveolar partial pressure, the expiratory partial pressure, the mixed expiratory partial pressure, the end-tidal partial pressure (PET), and the mean arterial partial pressure (Pa) were calculated as functions of the blood-gas partition coefficient and the diffusion coefficient (D) of the tracer gas. The blood-gas partition coefficient values were varied from 0.01-330.0, and four values of D were employed (0.5, 0.22, 0.1, and 0.01). Simulations were performed for three ventilation-perfusion conditions corresponding to rest and mild and moderate exercise. A reversed difference was found between PET and Pa in the simulated exercise conditions compared with the rest condition. This reversal was found to be directly reflected in the relation between the physiological dead space fraction and the Bohr dead space fraction. It is shown that the difference in these two dead space fractions (PET-Pa) depends on the blood-gas partition coefficient of the tracer gas, the buffering capacity of the lung tissue, and the stratification caused by diffusion-limited gas transport in the gas phase. N.B.

A83-37238

**EMOTIONAL EXCITATION AND PARAMETERS OF CARDIAC ACTIVITY DURING MUSCULAR WORK [EMOTSIONAL'NOE VOZBUZHDENIE I PARAMETRY DEIATEL'NOSTI SERDTSIA PRI MYSHECHNOI RABOTE]**

V. A. OLEINIKOV (Tsentral'nyi Institut Ekonomiki i Nauchno-Tekhnicheskoi Informatsii Ugol'noi Promyshlennosti, Stakhanov, USSR) *Fiziologicheskii Zhurnal* (Kiev) (ISSN 0201-8489), vol. 29, May-June 1983, p. 304-308. In Russian. refs

The effect of muscular activity (static, dynamic, or a combination of the two) on the emotional condition of healthy males, 25-40 years of age, was investigated by measuring the changes in the EKG parameters of the cardiac activity. The formulation of a negative emotional condition in a subject (the development of fatigue or the sense of heavy work) was accompanied by a decrease in the duration of the EKG T-wave. The negative emotional action of arm cyclic work occurred at a lower heart rate than for leg cyclic work. N.B.

A83-37241

**A MATHEMATICAL MODEL OF THE MECHANISM OF RESPIRATORY RHYTHMOGENESIS [MATEMATICHESKAIYA MODEL' MEKHANIZMA DYKHATEL'NOGO RITMOGENEZA]**

N. Z. KLIUEVA and A. I. PANIN (Akademiya Nauk SSSR, Institut Fiziologii, Leningrad, USSR) *Fiziologicheskii Zhurnal SSSR* (ISSN 0015-329X), vol. 69, April 1983, p. 433-438. In Russian. refs

A mathematical model is developed for the structures regulating the generation of rhythmic respiratory movements. This model is used to construct a scheme of the neuronal network which provides the correct alteration of respiratory phases within a wide range of physiological conditions. The basis of this proposed network is three pools of neurons: the I-alpha and I-beta inspiratory neurons and the additional pool of expiratory neurons E-E, which are excited by the I-beta neurons and inhibit the I-alpha neurons. The presence of the E-E pool provides for the stable expiratory inhibition of I-alpha neurons. The model takes into account the expiratory action of the stretch receptors of the lungs and the inspiratory action of the irritation receptors. N.B.

A83-37243

**THE BREATHING PATTERNS OF HUMANS DURING HYPERCAPNIA AND HYPOXIA [PATTERNY DYKHANIYA CHELOVEKA PRI GIPERKAPNII I GIPOKSII]**

I. S. BRESLAV, A. M. SHMELEVA, and S. M. SIDIKOV (Akademiya Nauk SSSR, Institut Fiziologii, Leningrad, USSR) *Fiziologicheskii Zhurnal SSSR* (ISSN 0015-329X), vol. 69, April 1983, p. 466-471. In Russian. refs

The responses of pulmonary ventilation to hypercapnia and hypoxia were investigated in six young males with different types of breathing patterns. The depth as well as the frequency of breathing was increased by both types of chemoreceptor stimulation of breathing. One subject with a tachypneic breathing pattern reacted to hypercapnic and hypoxic stimuli mainly by an increase in tidal volume, while another subject with bradypnea reacted to hypercapnic and hypoxic stimuli almost exclusively by faster breathing. Possible reasons for these different patterns are examined. N.B.

A83-37244

**THE REGULATION OF THE BREATHING PATTERN DURING MUSCULAR ACTIVITY IN CONDITIONS OF NORMAL AND ALTERED CHEMORECEPTOR STIMULATION [REGULIATSIYA PATTERNA DYKHANIYA PRI MYSHECHNOI DEIATEL'NOSTI V USLOVIAKH NORMAL'NOI I IZMENENNOI KHEMORETSEPTORNOI STIMULIATSII]**

G. G. ISAEV (Akademiya Nauk SSSR, Institut Fiziologii, Leningrad, USSR) *Fiziologicheskii Zhurnal SSSR* (ISSN 0015-329X), vol. 69, April 1983, p. 472-480. In Russian. refs

The quantitative relations between the tidal volume and the timing of the respiratory cycle (the breathing pattern) during rest and with increasing dosed muscular loads were investigated in 16 healthy men during conditions of normal and altered chemoreceptor

stimulation of breathing. It is shown that the breathing pattern of humans during muscular work reflects the characteristics of the functioning of the central mechanisms of respiratory rhythmogenesis which depend on the interaction of stimuli of different modalities. The effect of these stimuli is modulated by biomechanical factors, and therefore is subject to significant individual variations. In subjects with a tachypneic breathing pattern, the growth of ventilation during an increase in the work intensity is mainly due to a rise in tidal volume, while in subjects with bradypnea, the growth of ventilation under these conditions is due to the frequency of breathing. N.B.

**A83-37246**

**THE DURATION OF INHALATION AND EXHALATION IN GROWING HYPERCAPNIA AND THE EFFECT OF ADDITIONAL RESISTIVE INSPIRATORY RESISTANCE [DLITEL'NOST' VDOKHA I VYDOKHA PRI NARASTAIUSHCHEI GIPERKAPNII I VLIANIE DOBAVOCHNOGO REZISTIVNOGO INSPIRATORNOGO SOPROTIVLENIIA]**

M. A. POGODIN and E. L. KALACHEVA (Akademiia Nauk SSSR, Institut Fiziologii, Leningrad, USSR) Fiziologicheskii Zhurnal SSSR (ISSN 0015-329X), vol. 69, April 1983, p. 495-500. In Russian. refs

The patterns of the duration of inhalation and exhalation in conditions of progressing hypercapnia were studied in healthy subjects under the effect of resistive inspiratory resistance of 20 and 35 cm H<sub>2</sub>O/l/s. It was found that the inhalation lengthened while the exhalation shortened. The border between these ranges during free breathing corresponded to a CO<sub>2</sub> tension of exhalation terminal portion (P-ET-CO<sub>2</sub>) of 47.2 ± or - 1.00 mm Hg. The first range was found in 2/3 of the cases studied. Under the effect of additional inspiratory resistance, the border between the two ranges of inhalation patterns shifted toward greater values of P-ET-CO<sub>2</sub> and was 51.0 ± or - 1.0 mm Hg for greater resistance. It is proposed that the shift in the border between the ranges of the inhalation duration pattern observed in breathing with a resistive load during growing hypercapnia is a result of an increase of cortical influences on breathing and/or a weakening of afferentation from the stretch receptors of the lungs in these conditions. N.B.

**A83-37771**

**INHIBITORY INFLUENCE OF UNSTIMULATED RODS IN THE HUMAN RETINA - EVIDENCE PROVIDED BY EXAMINING CONE FLICKER**

S. H. GOLDBERG, T. E. FRUMKES, and R. W. NYGAARD (Queens College, New York, City University, New York, NY) Science (ISSN 0036-8075), vol. 221, July 8, 1983, p. 180-182. refs (Contract NIH-EY-01802)

In the parafoveal retina of human observers, cone-mediated sensitivity to flicker decreases as rods become progressively more dark-adapted. This effect is greatest when a rod response to flicker is precluded. These results indicate that rods tonically inhibit cone pathways in the dark. Author

**A83-38169**

**THE PHYSIOLOGICAL ADVISABILITY OF VOLUNTARY CONTROL OF RESPIRATION IN ATHLETES [FIZIOLOGICHESKAIA TSELESOOBRAZOST' PROIZVOL'NOI REGULIATSII DYKHANIYA W SPORTSMENOV]**

N. A. FUDIN (Vsesoiuznyi Nauchno-Issledovatel'skii Institut Fizicheskoi Kul'tury, Moscow, USSR) Teoria i Praktika Fizicheskoi Kul'tury (ISSN 0040-3601), Feb. 1983, p. 21-25. In Russian. refs

The question of the advisability of the voluntary control of respiration for the performance of physical exercise (and possibly other hypoxic situations) is considered. Previous work showing the effects of voluntary control on ventilatory gas-exchange functions as well as respiratory rhythm, tempo, amplitude and structure, is noted along with attempts at the development of an optimal breathing pattern for athletes engaging in endurance sports. Results are then presented of an experiment in which track runners were trained in hypoventilation at rest or during exercise. Results demonstrate the formation of new breathing patterns corresponding to conditioned reflex mechanisms of respiratory control

physiologically appropriate to the new level of functioning of the individual. Implications for the control of other visceral functions are noted A.L.W.

**A83-38170**

**THE PATTERN OF PHYSICAL AND MENTAL WORK CAPACITY DEPENDING ON THE LEVEL OF HYPERTHERMIA IN ATHLETES [DINAMIKA FIZICHESKOI I UMSTVENNOI RABOTOSPOBOSTI V ZAVISIMOSTI OT STEPENI GIPERTERMII ORGANIZMA SPORTSMENOV]**

V. I. SOBOLEVSKII, S. L. DZHARAKIANTS, and V. N. SHAMARDIN (Gosudarstvennyi Institut Fizicheskoi Kul'tury, Leningrad, USSR) Teoria i Praktika Fizicheskoi Kul'tury (ISSN 0040-3601), Feb. 1983, p. 26, 27. In Russian. refs

**A83-38171**

**THE EFFECT OF INVERTED GYMNASTIC EXERCISES ON THE HEMODYNAMIC AND RESPIRATORY INDICATORS OF STUDENTS [VLIANIE INVERTNYKH GIMNASTICHESKIKH POKAZHNENII NA GEMODINAMICHESKIE I DYKHATEL'NYE POKAZATELI STUDENTOV]**

E. D. EVTUSHENKO and V. N. CHUMAKOV (Nezhinski Gosudarstvennyi Pedagogicheskii Institut, Nezhin, Ukrainian SSR) Teoria i Praktika Fizicheskoi Kul'tury (ISSN 0040-3601), Feb. 1983, p. 27, 28. In Russian.

**A83-38172**

**THE OPTIMAL SPEED OF CYCLIC LOCOMOTION IN INDIVIDUALS OF DIFFERENT AGES [OPTIMAL'NAIA SKOROST' TSIKLICHESKIKH LOKOMOTSII U LIUDEI RAZNOGO VOZRASTA]**

V. L. UTKIN and V. V. ZAITSEVA (Gosudarstvennyi Tsentral'nyi Institut Fizicheskoi Kul'tury, Moscow, USSR) Teoria i Praktika Fizicheskoi Kul'tury (ISSN 0040-3601), Feb. 1983, p. 34-37. In Russian. refs

The optimal intensity of three common types of cyclic sports (walking, running, and cross-country skiing) was studied in individuals of various ages and different conditions of physical work capacity. The investigations involved 135 individuals, including children 11-12 years of age, trained and untrained youths 15-17 years of age, and fully-grown individuals, as well as healthy elderly individuals and elderly individuals with ischemic heart disease in the rehabilitation phase following myocardial infarction. The studies were conducted in laboratory conditions and were based on gas analysis, radio pulsometry, and tachycardiography. Among other results, it was found that the optimal speed of walking and running for untrained individuals increased during the transition from childhood to fully-grown individuals, declined slightly for elderly individuals, and decreased significantly for individuals with diseases of the cardiovascular system. The optimal speed of all three types of activities was higher for trained individuals than untrained individuals of the same age groups. The optimal speed of all three types of activities was lower for women than for men. N.B.

**A83-38173**

**GENETIC PREDISPOSITIONS IN HUMAN LEARNING OF MOTOR ACTIONS [GENETICHESKIE PREDPOSYLKI V OBUCHENII DVIIGATEL'NYM DEISTVIAM CHELOVEKA]**

L. P. SERGIENKO and V. P. KORENEVICH (Nikolaevskii Gosudarstvennyi Pedagogicheskii Institut, Nikolaev, Ukrainian SSR) Teoria i Praktika Fizicheskoi Kul'tury (ISSN 0040-3601), Feb. 1983, p. 41-45. In Russian. refs

The influence of hereditary and environmental factors on the speed of learning different motor actions was investigated in 24 pairs of monozygotic and 26 pairs of dizygotic twins 11-17 years of age. It was found that hereditary factors had a greater influence on the learning of motor actions in humans than environmental factors. The mastery of motor actions requiring simpler coordination was determined to be controlled more by genotype than motor actions requiring more complex coordination patterns. In addition, hereditary influence was found to be more important than environmental factors in the speed of learning motor actions using the dominant hand. N.B.



A83-38176

**CHARACTERISTICS OF THE LEFT VENTRICULAR BLOOD EXPULSION PHASE DURING ARTERIAL HYPERTENSION AND AORTAL STENOSIS [KHARAKTERISTIKI FAZY IZGNANIYA KROVI IZ LEVOGO ZHELUDCHKA PRI ARTERIAL'NOI GIPERTENZII I AORTAL'NOM STENOZE]**

L. I. FEDOSENKO, A. D. SMIRNOV, and E. V. LOVIAGIN (Tsentral'nyi Nauchno-Issledovatel'skii Rentgenoradiologicheskii Institut, Leningrad, USSR) Kardiologiya (ISSN 0022-9040), vol. 23, Feb 1983, p. 74-77. In Russian. refs

A study is presented of the hemodynamics in 57 patients with arterial hypertension and 16 patients with aortic stenosis. Results show that the pressure curve in the ascending aorta corresponds in all situations to the ascending exponent with different time constants. In normal individuals, the constant for the expulsion time was  $0.63 \pm 0.002$  sec for middle-aged subjects (44  $\pm$  or - 4 years), with the ratio of expulsion time/time constant being 4.01. In patients with hypertension, the expulsion time constant was  $0.095 \pm 0.03$  sec with an expulsion time/time constant ratio of 2.6, while in patients with aortic stenosis these values were 0.170 sec and 1.72, respectively. The differences between calculations of the stroke volume of the left ventricle and measurements using ventriculography were not significant. N.B.

A83-38177

**MECHANISMS OF THE REGULATION OF HIGH CARDIAC OUTPUT IN PATIENTS WITH HYPERTENSION (ANGIOCARDIOGRAPHIC INVESTIGATION) [MEKHANIZMY REGULIATSII VYSOKOGO SERDECHNOGO VYBROSA U BOL'NYKH GIPERTONICHESKOI BOLEZN'IU /ANGIOKARDIOGRAFIKHOE ISSLEDOVANIE/]**

P. F. PETROVSKII and L. S. MATVEEVA (Akademiya Meditsinskikh Nauk SSSR, Moscow, USSR) Kardiologiya (ISSN 0022-9040), vol. 23, Feb. 1983, p. 49-52. In Russian. refs

The roles of the Frank and Starling mechanisms and the inotropic condition of the myocardium during the genesis of high cardiac output are investigated using angiocardiology in 39 patients with hypertension. Results show that stroke and cardiac outputs were increased due to an increase in venous inflow. Despite the increased general pumping function of the left ventricle, the inotropic condition of the hypertrophic myocardium was reduced. The stabilization of the arterial hypertension and the decrease of the cardiac output resulted in the total peripheral resistance assuming the main role in the regulation of cardiac output. During earlier stages of the development of hypertension, cardiac output was found to be either normal or at reduced levels, with venous inflow being the main factor controlling cardiac and stroke outputs. N.B.

A83-38178

**HEMODYNAMIC INDICATORS, THE PHASIC PATTERN OF THE SYSTOLE OF THE LEFT AND RIGHT VENTRICLES OF THE HEART, AND THE CONDITION OF PULMONARY BLOOD CIRCULATION AND MICROCIRCULATION IN PATIENTS WITH HYPERTENSION DURING TREATMENT WITH ADELPHANE ESIDREX [GEMODINAMICHESKIE POKAZATELI, FAZOVAIA STRUKTURA SISTOLY LEVOGO I PRAVOGO ZHELUDCHKOV SERDTSYA, SOSTOIANIE LEGOCHNOGO KROVOOBRAZHENIYA I MIKROTSIRKULIATSII U BOL'NYKH GIPERTONICHESKOI BOLEZN'IU PRI LECHENII PREPARATOM ADEL'FAN-EZIDREKS]**

L. A. SHVEDENKO, K. E. NIKULIN, S. T. IURKEVICH, N. I. GERASIMENKO, V. P. KOZAK, M. D. NEPORADNYI, P. V. BIGAR (Ivano-Frankovskii Meditsinskii Institut, Ivano-Frankovsk, Ukrainian SSR), and P. M. VAKALIUK Kardiologiya (ISSN 0022-9040), vol. 23, Feb 1983, p. 61-65. In Russian. refs

A83-38180

**ASYMMETRICAL HYPERTROPHY OF THE MYOCARDIUM IN PATIENTS WITH HYPERTENSION (ACCORDING TO ECHOCARDIOGRAPHIC DATA) [ASIMMETRICHESKAYA GIPERTROFIIA MIOKARDA U BOL'NYKH GIPERTONICHESKOI BOLEZN'IU /PO DANNYM EKHOKARDIOGRAFI/]**

A. V. SMOLENSKII (Akademiya Meditsinskikh Nauk SSSR, Moscow, USSR) Kardiologiya (ISSN 0022-9040), vol. 23, Feb 1983, p. 69-73. In Russian. refs

The use of echocardiography in the diagnosis of asymmetrical hypertrophy of the ventricular septum in patients with hypertension is investigated. It is found that 4-5 percent of hypertensive patients have asymmetrical hypertrophy of the ventricular septum. Echocardiography is a simple, noninvasive method for diagnosing this condition and can be used for dynamic observations during the treatment of this condition. The contractile function of the myocardium in patients with this condition is found to remain normal for an extended period of time, although the dilation is affected. The nitroglycerine test can be used to obtain functional indications of an obstruction in the outflow tract of the left ventricle in hypertensive patients with asymmetrical hypertrophy of the ventricular septum. N.B.

A83-38183

**SEVERAL CHARACTERISTICS OF THE ADAPTATION PROCESS DURING VIBRATIONAL LOADS IN GRINDERS [NEKOTORYE OSOBENOSTI PROTSESSOV ADAPTATSII PRI VIBROSILOVYKH NAGRUZKAKH U SHLIFOVSHCHIKOV]**

A. M. MIKULINSKII, T. M. RADZIUKEVICH, L. T. SUDONINA, L. S. SHEIMAN, N. N. KOSSOVSKII, and N. V. FRIGO (Institut Gigieny Truda i Profzabolevaniy, Gorki, USSR) Gigiena Truda i Professional'nye Zabolevaniya, March 1983, p. 8-11. In Russian.

A83-38184

**SUBJECTIVE AND OBJECTIVE METHODS IN THE DIAGNOSIS OF FATIGUE [SUB'EKTIVNYE I OB'EKTIVNYE METODY V DIAGNOSTIKE UTOMLENIYA]**

IU. IA. KRISTIUKHAN (Ministerstvo Promyshlennosti Stroitel'nykh Materialov, Spetsial'noe Konstruktorskoe Biuro, Tallinn, Estonian, SSR) Gigiena Truda i Professional'nye Zabolevaniya, March 1983, p. 29-33. In Russian. refs

The significance of subjective and objective methods for diagnosing the level of fatigue (as differentiated from boredom, sleepiness, etc.) is examined based on findings concerning the type, location, and stage of fatigue (e.g., the chronic fatigue of some muscle) and the qualitative evaluation of the degree of fatigue. Data was collected for 365 workers in 10 different occupations in 8 light industry factories and building materials factories over the course of 16 years. Results show that both subjective and objective methods need to be utilized for an effective evaluation of fatigue, since the use of objective methods alone is not valid in the majority of cases. The use of subjective methods is found to be especially advantageous during the initial stage of the diagnosis of fatigue, during the collection of factual information. Among these advantages are the detection of causative factors promoting fatigue, the location of peripheral physiological shifts, and the determination of the temporal patterns of fatigue. N.B.

A83-38185

**PHYSICAL STRESS DURING WORK AND THE INCIDENCE OF DISEASE IN WORKERS [FIZICHESKOE NAPRIAZHENIE PRI TRUDE I ZABOLEVAEMOST' RABOCHIKH]**

IU. G. SOLONIN and V. K. CHECHULIN (Institut Gigieny Truda i Profzabolevaniy, Sverdlovsk, USSR) Gigiena Truda i Professional'nye Zabolevaniya, March 1983, p. 33-36. In Russian. refs

A study is presented of the role played by physical stress in the origin of pathologies and traumatism in workers performing manual or semi-automated work. The main parameter for the condition of the workers' health is taken as the incidence of disease with temporary loss of working capability, based on data collected over the course of 3 years for 18 groups of workers engaged in work requiring various levels of physical exertion. Results show

that the level of physical load directly correlates with the amount of physical stress during work and also with the incidence of disease with temporary loss of working capability. For work at similar levels of physical load and functional stress, female workers have a higher incidence of disease resulting in temporary loss of working capability than male workers. N.B.

## A83-38186

**A TEST FOR EVALUATING MUSCULAR FATIGUE [TEST DLIA OTSENKI MYSHECHNOGO UTOMLENIIA]**

V. I. THHOREVSKII and V. P. SILANTEV (Akademiia Meditsinskikh Nauk SSSR, Moscow, USSR) Gigiena Truda i Professional'nye Zabolevaniia, March 1983, p. 36-38. In Russian. refs

A test for determining the level of muscular fatigue is developed which includes the retention of dosed physical loads at 50 percent of the maximum arbitrary force for 30 sec during the simultaneous registration of the biopotentials of the working muscles at the 1st and 30th seconds. The criterion of fatigue as a result of static or dynamic work is taken as the increase in the amplitude of the biopotentials of the working muscles. A comparison of this test with other methods of determining muscular fatigue shows that this method is sufficiently informative, sensitive, and objective, and it provides values in good agreement with those obtained using other methods. The application of this method is recommended in situations when the electromyogram of the working muscles does not allow a reliable and well-defined interpretation of the results due to the large variety of working movements and the impossibility of choosing one of these movements with a sufficiently constant structure. N.B.

## A83-38188

**THE VARIOUS EFFECTS ON THE BODY OF CONTINUOUS AND NONCONTINUOUS WORK WITH VIBRATING HAND TOOLS [O RAZLICHNOM DEISTVII NA ORGANIZM NEPRERYVNOI I PRERYVISTOI RABOTY S VIBRIRUIUSHCHIMI RUCHNYMI MASHINAMI]**

N. P. ARTAMONOV (Meditsinskii Institut, Rostov-on-Don, USSR) Gigiena Truda i Professional'nye Zabolevaniia, March 1983, p. 41, 42. In Russian.

The possible differences in the effects on the human body of continuous and noncontinuous work with vibrating hand tools are studied in order to provide information for designing the best regimes of work with these types of tools. The heart rate, EKG, rheogram, skin temperature, and vibration sensitivity were measured in 10 healthy males, 20-30 years of age, who used vibrating hammers with various regimes of vibration. An analysis of the changes of the physiological indicators shows the positive influence of short periodic interruptions in work with vibrating hammers on the functional condition of the subjects. The calculations show that the average shift of values of the physiological indicators with respect to the initial values is two times lower for noncontinuous work than for continuous work. In addition, the recovery of the physiological indicators to the initial values is two times faster after noncontinuous work than with continuous work. N.B.

## A83-38189

**AN INVESTIGATION OF THE BIODYNAMIC PROPERTIES OF THE HUMAN BODY UNDER GENERAL LOW-FREQUENCY VIBRATION [ISSLEDOVANIE BIODINAMICHESKIKH SVOISTV TELA CHELOVEKA PRI OBSHCHEI NIZKOCHESTOTNOI VIBRATSII]**

E. L. MAKSIMOVA and I. U. N. NEDOMERKOV (Ministerstvo Putei Soobshcheniia SSSR, Institut Zheleznodorozhnoi Gigieny, Moscow, USSR) Gigiena Truda i Professional'nye Zabolevaniia, March 1983, p. 43, 44. In Russian.

The effect of sinusoidal and random vibrations with vibrational accelerations of 10-40 cm/sq sec on the human body is studied in 10 male subjects in order to determine the boundaries of the first vibration frequency resonance band for the human body. Results show that resonance phenomena for the human body occur at frequencies of 3-9 Hz, with resonance phenomena for the human head occurring at low frequency oscillations with

discrete frequencies of 4 and 6 Hz. Resonance phenomena are more expressed during the action of sinusoidal oscillations than during random vibrations. During random vibrations, resonance phenomena increase with growing vibrational accelerations. N.B.

## A83-38190

**AN INVESTIGATION OF THE VIBRATION SENSITIVITY OF WORKERS IN OCCUPATIONS WITH VIBRATION-RELATED HAZARDS [K VOPROSU IZUCHENIIA VIBRATSIONNOI CHUVSTVITEL'NOSTI RABOTNIKOV RAZLICHNYKH VIBROOPASNYKH PROFESSII]**

I. V. RATNIKOVA (ZPO 'Motorostroitel', Zaporozhye, Ukrainian SSR) Gigiena Truda i Professional'nye Zabolevaniia, March 1983, p. 44, 45. In Russian.

## A83-38191

**THE CEREBRAL BLOOD CIRCULATION OF PATIENTS WITH VIBRATION DISEASE DURING TREATMENT AT HEALTH RESORTS [TSEREBRAL'NOE KROVOOBRASHCHENIE BOL'NYKH VIBRATSIONNOI BOLEZNI V PROTSESSE KURORTNOGO LECHENIIA]**

A. A. ELGAROV (Kabardino-Balkarskii Gosudarstvennyi Universitet, Nalchik, USSR) Gigiena Truda i Professional'nye Zabolevaniia, March 1983, p. 45-47. In Russian. refs

A rheoencephalographic study is presented of the cerebral blood circulation in patients with vibration disease due to the effects of general and local vibration. The patterns of this disease were studied in 267 construction workers, 30-50 years of age, who had suffered from vibration disease for 2-7 years and who were receiving treatments at health resorts. It was found that treatments in hot baths acted to reduce the effects of the disease even after 3-6 procedures, including reductions in the intensity of headaches, nervous manifestations, pains in the extremities, and symptoms of neurovascular disorders. Towards the end of the treatments, signs of central nervous system disorders disappeared in 26.5 percent of the patients and decreased in 39.5 percent of the patients. N.B.

## A83-38192

**THE EFFECT OF SHIP NOISE ON SAILORS DURING PROLONGED SEA VOYAGES [VLIANIE SUDOVOGO SHUMA NA MORIAKOV V USLOVIIAKH DLITEL'NOGO PLAVANIIA]**

S. A. RADZIEVSKII, A. A. VOLKOV, A. V. IGREVSKII, L. N. KYSHTYMOVA, and V. A. SKRUPSKII (Ministerstvo Zdravookhraneniia SSSR, Institut Gigieny Vodnogo Transporta, Moscow, USSR) Gigiena Truda i Professional'nye Zabolevaniia, March 1983, p. 48-50. In Russian. refs

## A83-38193

**AGE-RELATED CHANGES OF INTERNEURONAL CONNECTIONS IN THE CEREBRAL CORTEX OF HUMANS [VOZRASTNYE IZMENENIIA MEZHNEIRONNYKH SVIAZEI KORY BOL'SHOGO MOZGA CHELOVEKA]**

A. S. IONTOV (Akademiia Nauk SSSR, Institut Fiziologii, Leningrad, USSR) and V. F. SHEFER (Nauchno-Issledovatel'skii Psikhonevrologicheskii Institut, Leningrad, USSR) Arkhiv Anatomii, Gistologii i Embriologii (ISSN 0004-1947), vol. 84, Feb. 1983, p. 5-9. In Russian. refs

The age-related changes in the dendrites, axons, and axonal terminals of the 40th field of the cerebral cortex were studied in five humans 75-83 years of age, who did not suffer any psychic or neurological illnesses. Also investigated were the patterns of these changes and the differences between the changes observed in humans and in cats. Changes in the dendrites were found in all of the individuals studied, which showed certain degenerative alterations in the dendrites and their loss of synaptic contacts with the axon terminals. Changes in the axons included reversible functional alterations (a tight arrangement of a large number of coarse neurotubules with the retention of axoplasm) and, less often, nonreversible alterations. Age-related changes of the axon terminals are considered as dark and light types of the degeneration of the synaptic endings. It is concluded that a gradual degeneration

and death of neurocytes is one of the main causes of disorders of the interneuronal connections of the cerebral cortex N.B.

**A83-38194**

**CHOLINERGIC AND ADRENERGIC INNERVATION OF INTRACEREBRAL ARTERIES DURING ONTOGENESIS IN HUMANS [KHOLINERGICHESKAIA I ADRENERGICHESKAIA INNERVATSIIA VNUTRIMOZGOVYKH ARTERII CHELOVEKA V ONTOGENEZE]**

V. M. CHERTOK, I. I. PIGOLKIN, and P. A. MOTAVKIN (Vladivostokskii Meditsinskii Institut, Vladivostok, USSR) Arkhiv Anatomii, Gistologii i Embriologii (ISSN 0004-1947), vol. 84, Feb. 1983, p. 22-29. In Russian refs

The development of cholinergic and adrenergic nerve fibers in the intracerebral arteries was studied in the cortical regions of the motor, auditory, and visual analyzers in humans at ages from the second half of pregnancy to 86 years of age. The adrenergic and cholinergic fibers are found at all periods of ontogenesis on the radial arteries and the large branches. It is found that the development of the cholinergic fibers (as determined by acetylcholinesterase reactions) is faster than the development of the adrenergic fibers (as determined by reactions with glyoxylic acid), while the involution of adrenergic fibers occurs earlier than cholinergic fibers. It is concluded that during ontogenesis, the nerve structures of the intracerebral arteries undergo quantitative and qualitative changes which correspond to the metabolic needs of local regions of the brain N.B.

**A83-38197**

**THE EFFECT OF A DECREASED FUNCTIONAL LOAD ON A SKELETAL MUSCLE [VLIANIE PONIZHENNOI FUNKSIONAL'NOI NAGRUZKI NA SKELETNUIU MYSHTSU]**

V. A. SOLOVEV (Kalininskii Meditsinskii Institut, Kalinin, USSR) Arkhiv Anatomii, Gistologii i Embriologii (ISSN 0004-1947), vol. 84, Feb. 1983, p. 55-60. In Russian. refs

The effect of a decreased functional load on the musculus masseter was studied in men 19-24 years of age who had undergone an operation to correct a disorder which led to an excessive growth of the mandible and resulted in difficulties in eating and chewing food. The activity of succinate dehydrogenase, the ratios of myons of various types, the cross section areas of muscle fibers, the ratios of the contents of connective tissue layers, the number of blood capillaries around the myons, and the relative volume of the submicroscopic structures of the muscle fiber were examined using quantitative optical, histochemical, and electron microscopic studies of the skeletal muscles. No pronounced pathological disorders were found in the muscles following the surgical correction which led to a reduced load on the muscles. The ratio of the myons of type I (red fibers) to those of the controls was found to increase, while the number of capillaries around the myons decreased and the volume of connective tissue grew. In addition, significant changes in the ultrastructure of the energy and contractile apparatus were observed. N.B.

**A83-38199**

**THE STRUCTURAL-FUNCTIONAL ORGANIZATION OF THE FIBROUS FRAMEWORK OF THE ACHILLES TENDON IN HUMANS [STRUKTURNO-FUNKSIONAL'NAIA ORGANIZATSIIA VOLOKNISTOGO OSTOVA AKHILLOVA SUKHOZHILIIA CHELOVEKA]**

N. P. OMELIANENKO (Ministerstvo Zdravookhraneniia SSSR, Nauchno-Issledovatel'skaia Laboratoriia Biologicheskikh Struktur, Moscow, USSR) Arkhiv Anatomii, Gistologii i Embriologii (ISSN 0004-1947), vol. 84, Feb. 1983, p. 69-77. In Russian refs

**A83-38200**

**INDICATORS OF THE CARDIOVASCULAR SYSTEM FUNCTION DURING THE WORK ACTIVITY OF SCIENTIFIC WORKERS [POKAZATELI FUNKTSII SERDECHNO-SOSUDISTOI SISTEMY V PROTSESSE TRUDOVOI DEIATEL'NOSTI NAUCHNYKH RABOTNIKOV]**

V. I. AKHUNDOV, V. G. KNABENGOF, and V. A. VALITSKII (Azerbaidzhanskii Nauchno-Issledovatel'skii Institut Virusologii, Mikrobiologii i Gigieny, Baku, Azerbaidzhan SSR) Gigiena i Sanitariia (ISSN 0016-9900), Feb. 1983, p. 16-18. In Russian. refs

The regulation of cardiovascular functions during normal working conditions was investigated in 21 female scientific workers, 35-45 years of age, who conducted experimental work during first half of the day and other scientific-organizational work during the rest of the day. The arterial blood pressure, EKG, and integral rheogram were recorded for each subject at various times during the day. Also investigated was the cardiac activity at other periods during the day using radiotelemetric observations of EKG patterns. Results show that the cardiovascular system parameters depend on the nervous and emotional state, as well as the amount of movement, of the subjects before and at the very beginning of the work day. Later in the day, these parameters depend on the degree of physical activity, the nervous and emotional stress during various situations of scientific activity, the growing fatigue at the end of the working day, and the corticovisceral effects during the transition to after-work activities N.B.

**A83-38202**

**THE DIAGNOSIS OF CHANGES IN THE VESSELS AND MEMBRANES OF EYES USING FLUORESCENT ANGIOGRAPHY [FLIUORESTSENTNO-ANGIOGRAFICHESKAIA DIAGNOSTIKA IZMENENII V SOSUDAKH I MEMBRANAKH GLAZ]**

A. P. BALUTINA (Voenno-Meditsinskii Zhurnal (ISSN 0026-9050), March 1983, p. 51, 52. In Russian.

Fluorescent angiography can be used to determine the early changes in the vessels and membranes of the eye at times earlier than other clinical ophthalmological methods of diagnosis such as ophthalmoscopy and biomicroscopy. This feature of fluorescent angiography is very important for the opportune diagnosis of pathological processes and the dynamic observation of their development for various eye diseases. Observations are presented for the use of fluorescent angiography in 352 patients for diagnosing the initial vascular changes in the eye and in determining the appropriate therapeutic measures. Among the diseases discussed are atherosclerotic changes in the eye (90 patients), central serous chororetinal pathologies (55 patients), diabetes (32 patients), hypertension and thrombo-embolism of the vessels (27 cases), chororetinitis (61 cases), and pathologies of the optic nerve (20 cases). N.B.

**A83-38926**

**THE DIAGNOSTICS OF THE SUBCLINICAL STAGE OF VIBRATION SICKNESS [O DIAGNOSTIKE SUBKLINICHESKIOI STADII VIBRATSIONNOI BOLEZNI]**

B. E. PETRENKO and N. V. KUTELEV (Vsesoiuznyi Nauchno-Issledovatel'skii Institut Zheleznodorozhnoi Gigieny, Moscow, USSR) Gigiena Truda i Professional'nye Zabolevaniia, Feb. 1983, p. 47-50. In Russian. refs

The differential diagnosis of the subclinical stage of vibration sickness from the usual occupational stigmata of working in a vibration environment is studied. A diagnostic procedure involving the evaluation of working conditions, physical complaints, history and clinical condition and specific tests for vibration sickness was performed on 522 individuals having contact with local or whole-body vibration. On the basis of this procedure, four groups of workers were distinguished: those lacking the stigmata of occupational contact with vibration, those exhibiting occupational stigmata related to pain and vibration sensitivity and changes in microcirculation but with no specific complaints or decline in work capacity; those with vascular responses to a cold test characteristic of vibration sickness but with no specific complaints or impairment (subclinical vibration sickness); and those with clinical disease.

Two instances of a transitional stage between the clinical and subclinical stages were also observed. The applicability of the methods studied to the clinical setting is noted. A.L.W.

## A83-38927

**INTEGRAL DETERMINATION OF CHANGES IN CENTRAL NERVOUS SYSTEM FUNCTIONING DURING MENTAL WORK [INTEGRAL'NOE OPREDELENIE IZMENENIIA FUNKSIONAL'NOGO SOSTOIANIIA TSENTRAL'NOI NERVNOI SISTEMY PRI UMSTVENNOM TRUDE]**

K. A. LISITSYNA (Ministerstvo Zdravookhraneniia SSSR, Institut Gigieny Detei i Podrostkov, Moscow, USSR) Gigiena Truda i Professional'nye Zabolevaniia, Feb 1983, p. 7-10. In Russian.

A two-minute writing test is presented as a means for the overall assessment of changes in central nervous system functioning during the performance of various types of mental work. Cortical-subcortical interaction is assessed according to parameters derived from the recording of the force characteristics of the pressure curve, galvanic skin response and heart rate during writing, resulting in the computation of a coefficient of fatigue for each parameter. The method has been used to evaluate mental changes in 66 students during a lesson, resulting in the detection of three types of response: initial cortical fatigue, cortical-subcortical fatigue, and no fatigue. Results are used to derive a single generalized indicator of CNS functioning taking into account weighted contributions from each parameter. A.L.W.

## A83-38929

**ESTABLISHMENT OF THE OPTIMAL IRRADIANCE OF MAN AT LOW AMBIENT TEMPERATURES IN THE WORKPLACE [OBOSNOVANIE OPTIMAL'NYKH INTENSIVNOSTEI OBLUCHENOSTI CHELOVEKA PRI NIZKIKH TEMPERATURAKH SREDY NA RABOCHIKH MESTAKH]**

A. A. KASPAROV, V. N. SHAMARIN, and P. F. AFANASEVA (Akademiia Meditsinskikh Nauk SSSR, Moscow, USSR) Gigiena Truda i Professional'nye Zabolevaniia, Feb. 1983, p. 38-41. In Russian. refs

The optimal irradiance from a local radiant heater necessary to ensure the thermal comfort of a clothed man working under low-temperature conditions is investigated. Experiments were performed in a laboratory cold chamber at temperatures from -1 to -9 C with an experimental electrical radiant heater while subjects performed a moderate level of physical work (energy expenditure 208 W). Values of the mean radiant intensity necessary to provide thermal comfort were obtained as a function of ambient temperature, and found to correspond to temperatures of 14 to 17.5 C at the trunk, arms and legs, and 9 to 14 C at the (uncovered) head. A.L.W.

## A83-38930

**DRUG THERAPY OF HYPERTENSION IN DRIVERS [K MEDIKAMENTOZNOI TERAPII GIPERTONICHESKOI BOLEZNI U VODITELEI]**

A. Z. TSFASMAN, I. F. STARYKH, L. S. NERSESIAN, and E. G. BURAKHZON (Vsesoiuznyi Nauchno-Issledovatel'skii Institut Zheleznodorozhnoi Gigieny, Moscow, USSR) Gigiena Truda i Professional'nye Zabolevaniia, Feb 1983, p. 13-17. In Russian. refs

Consideration is given to the problem of the side effects of drugs used in the treatment of hypertension in drivers. Results of studies on railroad engineers are presented which demonstrate the effects of a 7-day course of treatment with various drugs or drug combinations on blood pressure and psychological functions related to driving safety. Reserpine, vincapan and hemiton (clonidine) are shown to induce the greatest deteriorations in preparedness for emergency action, while anaprilin (propanolol), alone and in combination with apressin (hydralazine), reserpine combined with caffeine, and hemiton combined with caffeine produced no detectable effects. Possible approaches to the solution of the problem of the treatment of hypertensive drivers are then outlined, including the search for new hypotensive agents, the combination of hypotensives with compensatory drugs, the selection of drivers tolerant to hypotensive-induced impairments,

and the optimization of the treatment regimen with regard to individual characteristics. A.L.W.

## A83-38944#

**THE BEHAVIOR OF HEART RATE IN FLIGHT UNDER +GZ STIMULATION CONTINUOUS MONITORING USING HOLTER'S METHOD AND CATECHOLAMINE EXCRETION [COMPORTAMENTO DELLA FREQUENZA CARDIACA IN VOLO IN CONDIZIONI DI STIMOLAZIONE +GZ. MONITORAGGIO CONTINUO SEC. HOLTER ED ESCREZIONE CATECOLAMINICA]**

G. CALCAGNINI, M. CIAVARELLA, A. DE ZORZI, G. GERMANO (Roma, Università, Rome, Italy), C. A. RAMACCI (Scuola Militare di Sanita Aeronautica, Rome, Italy), and A. OTTALEVI (Centro Studi e Ricerche di Medicina Aeronautica e Spaziale, Rome, Italy) Rivista di Medicina Aeronautica e Spaziale (ISSN 0035-631X), vol. 46, July-Dec. 1981, p. 37-49. In Italian. refs

It is determined that tachycardia in pilots is not a phenomenon limited to the times of flight, but also appears before and after the flights. The level of tachycardia before and during flight is found to be more elevated in pilots with lesser amounts of flight experience. Positive accelerations of 5-6 Gz act to further increase the heart rate, especially in pilots exhibiting tachycardia before and during flight. The increase in heart rate observed within 2-3 hr after the end of the flight is determined to be independent of pre-flight and in-flight tachycardia and is especially evident in pilots who exhibit a moderate increase in heart rate before and during flight, as well as under +Gz stimulation. It is concluded that emotional or baroreceptor stress does not appear to be involved in this phenomenon. N.B.

## A83-38945#

**ETIOLOGICAL ASPECTS OF INDISPOSITIONS IN FLIGHT [ASPECTS ETIOLOGIQUES DES MALAISES EN VOL]**

G. LEGUAY, A. SEIGNEURIC (Hopital d'Instruction des Armees Dominique Larrey, Versailles, France), and J. PARSAL Rivista di Medicina Aeronautica e Spaziale (ISSN 0035-631X), vol. 46, July-Dec. 1981, p. 50-84. In French. refs

The etiology of flight indispositions, incapacitating conditions which alter perception and reaction but do not cause the individual to lose consciousness, is investigated based on the study of over 200 cases of these conditions over the course of 20 years. Sudden incapacities, such as myocardial infarcts and epilepsy, are not considered. The frequencies of these indispositions are analyzed according to the age, flight experience, and aircraft specialty and function of the individual. The etiology of flight indispositions is classified into four main groups: aeroautic factors (such as disorders arising from acceleration, high altitude, and flight under conditions of no visibility), human organic factors (such as digestive disorders and barotraumatism), human functional disorders (such as functional disturbances of the labyrinth, hypoglycemia, vagotonia, and spasmophilia), and psychological factors (such as depression and hypochondria). It is determined that the most frequent causes of flight indisposition are functional ones, primarily a triple syndrome characterized by hypervagotonia, spasmophilia, and functional hypoglycemia. This triple syndrome appears to be related to difficulties in psychological, functional, or ergonomic adaptation, or their various combinations. N.B.

## A83-39519

**VISUAL SENSATIONS EVOKED BY SINGLE ELECTRONS AND MUONS [ZRITEL'NYE OSHCHUSHCHENIIA, VYZVANNYE ODINOCHNYMI ELEKTRONAMI I MUONAMI]**

A. A. ARODZERO, P. V. GRAMENITSKII, and I. N. FETISOV (Moskovskoe Vysshee Tekhnicheskoe Uchilishche, Moscow, USSR) Akademiia Nauk SSSR, Doklady (ISSN 0002-3264), vol. 270, no. 3, 1983, p. 725-727. In Russian. refs

The limiting capabilities of the human eye to register visual sensations evoked by individual single-charged relativistic particles were investigated and the effectiveness of the human eye as a detector of these particles was evaluated. The experiments utilized cosmic ray particles at a height of 3250 m, where the charged components consist of electrons (65 percent), muons (30 percent),

and protons (4 percent). The experimental apparatus consisted of a scintillation telescope, which recorded the passage of these particles, aligned with the retina of the observers' eyes. The observers, whose vision was adapted to darkness, made a signal each time they perceived a visual sensation in either or both eyes. Results show that the human eye is capable of registering the passage of individual single-charged relativistic particles with an effectiveness of 1-8 percent. N.B.

#### A83-39936

##### ACCURATE VISUAL MEASUREMENT OF THREE-DIMENSIONAL MOVING PATTERNS

J. S. LAPPIN and M. A. FUQUA (Vanderbilt University, Nashville, TN) *Science* (ISSN 0036-8075), vol. 221, July 29, 1983, p. 480-482. refs

(Contract NSF BNS-78-05857, NSF BNS-81-12473)

Human observers discriminated relative three-dimensional distances in simple patterns of motion parallax with an acuity similar to vernier acuity under comparable conditions. Accurate visual measures of three-dimensional distance can be derived from the structural invariance of patterns undergoing perspective transformations. Author

#### A83-40352

##### THE AIR CANADA PROGRAMME FOR REHABILITATION OF THE ALCOHOLIC EMPLOYEE/PILOT

P. V. PALMER (Air Canada, Montreal, Canada) *Aviation, Space, and Environmental Medicine* (ISSN 0095-0562), vol. 54, July 1983, p. 592-594.

#### A83-40355

##### RETURN TO FLYING AFTER HEAD INJURIES - A REVIEW

J. L. FIRTH *Aviation, Space, and Environmental Medicine* (ISSN 0095-0562), vol. 54, July 1983, p. 603-608. refs

A review is presented of the studies concerning the pathology of head injury in relation to severity and to the chance of recovery, focusing on situations of aeromedical interest. It is noted that the return to flying status depends mainly on the hazard of subsequent post-traumatic epilepsy (PTEP). The treat of PTEP is assessed based on the incidence of onset of PTEP within 1 year (75 percent) and 2 years (85 percent) of head injury in those who will develop the complication. Clear risk markers which increase the chances of later PTEP are examined, including a past history of febrile convulsions, a family history of epilepsy, 'early' PTEP, intracranial hematoma, and depressed skull fracture. It is shown that the persisting risk in depressed skull fracture is itself adversely affected by early epilepsy, dural laceration, focal neurological signs, and post-traumatic amnesia longer than 24 hours. It is concluded that permanent prohibition on grounds of initial severity can rarely be warranted, and that a cautious open-minded assessment of each individual by aviation medical examiners with specialist referral where indicated should be implemented. N.B.

#### A83-40357

##### METHAZOLAMIDE AND ACETAZOLAMIDE IN ACUTE MOUNTAIN SICKNESS

A. D. WRIGHT (Birmingham Medical Research Expeditionary Society; General Hospital, Birmingham, England), A. R. BRADWELL (Birmingham Medical Research Expeditionary Society, Birmingham Medical School, Birmingham, England), and R. F. FLETCHER (Birmingham Medical Research Expeditionary Society, Dudley Road Hospital, Birmingham, England) *Aviation, Space, and Environmental Medicine* (ISSN 0095-0562), vol. 54, July 1983, p. 619-621. Research supported by Lederle Laboratories, the Arthur Thompson Trust Fund, and West Midlands Regional Health Authority. refs

Methazolamide (150 mg/d) was as effective as acetazolamide (500 mg/d) in preventing the symptoms of acute mountain sickness in 20 subjects ascending to 4985 m. PaO<sub>2</sub> and oxygen saturation levels were similar on the two drugs but the fall in PaCO<sub>2</sub> was greater on acetazolamide. Paraesthesiae, a side-effect of carbonic anhydrase inhibitors, tended to be less at high altitude on methazolamide and was significantly less when taking 100 mg/d

at low altitude. It is likely that paraesthesiae is similar on the two drugs when given in doses that affect blood gases equally.

Author

#### A83-40358

##### THE INCIDENCE OF REFRACTIVE ANOMALIES IN THE USAF RATED POPULATION

W. F. PROVINES, W. M. WOESSNER, A. J. RAHE, and T. J. TREDICI (USAF, School of Aerospace Medicine, Brooks AFB, TX) *Aviation, Space, and Environmental Medicine* (ISSN 0095-0562), vol. 54, July 1983, p. 622-627. refs

Results are presented of a field survey conducted in order to determine the percentage of U.S. Air Force pilots and navigators required to wear corrective lenses. The data was retrieved using a random sample survey stratified by major air commands. Among the data requested were initial (entry) visual acuity and refractive error, and current visual acuity and prescription if glasses were required. Completed and returned questionnaires comprised 2183 of the 2383 forms sent. It is found that almost 20 percent of the pilots and 50 percent of the navigators are required to wear corrective lenses while flying and that these percentages are rather consistent among the major air commands. It is determined that aircrew members who enter undergraduate pilot training with minus or plano refractive values are much more susceptible to develop myopia during their flying careers than those with plus refractive values. N.B.

#### A83-40360

##### CARDIOPULMONARY RESPONSES TO COMBINED LATERAL AND VERTICAL ACCELERATION

J. R. POPLOW (Canadian Forces Medical Service, Ottawa, Canada), J. H. VEGHTE (USAF, Aerospace Medical Research Laboratories, Wright-Patterson AFB, OH), and K. E. HUDSON (Systems Research Laboratories, Inc., Dayton, OH) *Aviation, Space, and Environmental Medicine* (ISSN 0095-0562), vol. 54, July 1983, p. 632-636. refs

To investigate the effects of a lateral G force, eight stress panel members were each subjected to a series of stresses using + or - 1.5, 2, or 2.5 Gy combined with either + or - 1 or + or - 2 Gz, for 30 s followed by a 60-s recovery period. Peripheral arterial oxygen saturation, utilizing a Hewlett-Packard 47201A ear oximeter and heart rate were recorded. A consistent fall in arterial oxygen saturation (SaO<sub>2</sub>) was observed during all the Gy/Gz exposures with the + Gy direction giving the lowest value of 90.1 percent SaO<sub>2</sub> (PaO<sub>2</sub> of less than 60 mmHg). A small but consistent increase in heart rate (HR) was also observed during, and for 15 to 20 s after the Gy/Gz exposure. These results indicate that the cardiopulmonary system is stressed during combined Gy/Gz acceleration and the most important change occurs in SaO<sub>2</sub>.

Author

#### A83-40361

##### EFFECTS OF VARIOUS LEVELS OF HYPOXIA ON PLASMA CATECHOLAMINES AT REST AND DURING EXERCISE

W. J. BUBB, E. T. HOWLEY, and R. H. COX (Tennessee University, Knoxville, TN) *Aviation, Space, and Environmental Medicine* (ISSN 0095-0562), vol. 54, July 1983, p. 637-640. refs (Contract NIH-HL-06036-01)

The relationship between hypoxia and heart rate (HR), pulmonary ventilation, plasma epinephrine (E), and norepinephrine (NE) at rest and during exercise at 40 percent of maximal oxygen uptake was investigated. This study examined the response of six subjects who were exposed to inspired gas mixtures containing 21, 19, 17, 15, and 13 percent O<sub>2</sub>. The duration of exposure to each mixture was 10 continuous min at rest, followed by 10 continuous min during exercise, while the order of the inspired gas mixtures was randomized. Results show that during the exercise test, HR was elevated with exposure to 15 and 13 percent O<sub>2</sub>, while pulmonary ventilation was higher at 13 percent O<sub>2</sub> than at the higher O<sub>2</sub> percents. No significant changes in plasma E or NE were found at rest or during exercise in response to the gas treatments. These findings indicate that acute exposure to hypoxic gas mixtures at rest and during light work does not result in



significant increases in sympathetic nervous system activity, as judged by the plasma E and NE response. N.B.

**A83-40362  
SUCCESSFUL REVERSAL OF PRESUMED CARBON MONOXIDE-INDUCED SEMICOMA**

L. M. YEE and G. K. BRANDON (USAF, Clinic Kadena, Kadena AFB, Japan) Aviation, Space, and Environmental Medicine (ISSN 0095-0562), vol. 54, July 1983, p. 641-643. refs

A case study is presented of the treatment of a semicomatose victim of presumed carbon monoxide poisoning with exchange transfusion, steroid therapy, and hyperbaric oxygenation. The victim, a 29 year old semicomatose male, was referred to the clinic with presumed carbon monoxide poisoning about 10 hr after having been discovered and after having received an exchange transfusion of 2000 ml whole blood. The victim was successfully treated with three hyperbaric oxygenation treatment dives on the carbon monoxide poisoning protocol (two 23-min O<sub>2</sub> breathing periods at 3 atm followed by two 25-min periods at 2 atm), steroid therapy, and supportive measures. One week following therapy, this individual exhibited no neurological or psychiatric sequelae. N.B.

**A83-40540  
ELECTROMAGNETIC AND MAGNETIC FIELDS IN THE TREATMENT OF ISCHEMIC HEART DISEASE [ELEKTROMAGNITNYE I MAGNITNYE POLIA V LECHENII ISHEMICHESKOI BOLEZNI SERDTSIA]**

V. M. BOGOLIUBOV and E. I. SOROKINA (Ministerstvo Zdravookhraneniia SSSR, Tsentral'nyi Nauchno-Issledovatel'skii Institut Kurortologii i Fizioterapii, Moscow, USSR) Kardiologiya (ISSN 0022-9040), vol. 23, March 1983, p. 108-110. In Russian. refs

The effect of a decimeter-wavelength electromagnetic field (10-20 W), a variable magnetic field, and a constant magnetic field on patients with ischemic heart disease was investigated during treatments over a period of several weeks. In addition to clinical observations before and after the treatments, regular EKG tests with physical loads on a bicycle ergometer were conducted, and the effects of the treatments on several enzymes in the blood (including lactate dehydrogenase and creatine phosphokinase) and several immunological indicators were determined. Results show that treatments with the electromagnetic field were effective in 81 percent of the cases, resulting in decreases in the frequency and intensity of stenocardia, as well as the normalizations of EKG values. Also observed were significant alterations of metabolism and immunology. Similar effects were found for treatments with a variable magnetic field in 66 percent of the patients examined, although the effects of a constant magnetic field did not differ significantly from the control values. N.B.

**A83-40541  
THE DIFFERENTIAL DIAGNOSIS OF FUNCTIONAL MURMURS AND DEFECTS OF THE HEART USING ULTRASONIC PULSE DOPPLER DETECTION [DIFFERENTIAL'NAIA DIAGNOSTIKA FUNKTSIONAL'NYKH SHUMOV I NEKOTORYKH POROKOV SERDTSIA S POMOSHCH'IU UL'TRAZVUKOVOI IMPUL'SNO-DOPPLEROVSKOI LOKATSII]**

N. V. GORIACHEVA, E. A. EFIMOVA, E. F. LUKUSHKINA, A. D. MANSFELD, and E. I. ROMANOV (Gor'kovskii Meditsinskii Institut, Gorki, USSR) Kardiologiya (ISSN 0022-9040), vol. 23, March 1983, p. 80-84. In Russian. refs

**A83-40542  
THE EVALUATION OF THE FUNCTIONAL CONDITION OF THE HEART IN PATIENTS WITH ISCHEMIC HEART DISEASE AT EARLY STAGES OF GRADED PHYSICAL LOADING [OTSENKA FUNKTSIONAL'NOGO SOSTOIANIYA SERDTSIA U BOL'NYKH ISHEMICHESKOI BOLEZNI SERDTSIA NA RANNIKH ETAPAKH DOZIROVANNOI FIZICHESKOI NAGRUZKI]**

N. K. FURKALO, N. V. RISHKO, and I. E. LIKHTENSHEIN (Ukrainskii Nauchno-Issledovatel'skii Institut Kardiologii, Kiev, Ukrainian SSR) Kardiologiya (ISSN 0022-9040), vol. 23, March 1983, p. 84-86. In Russian. refs

**A83-40543  
THE PHOSPHOLIPID CONTENT OF SUBFRACTIONS OF HIGH-DENSITY LIPOPROTEINS IN WOMEN WITH ANGIOGRAPHICALLY DOCUMENTED ATHEROSCLEROSIS OF THE CORONARY ARTERIES [FOSFOLIPIDNYI SOSTAV PODFRAKTSII LIPOPROTEIDOV VYSOKOI PLOTNOSTI U ZHENSCHIN S ANGIOGRAFICHESKI DOKUMENTIROVANNYM ATEROSKLEROZOM KORONARNYKH ARTERII]**

F. T. MAI, A. A. LIAKISHEV, V. A. POLESSKII, B. A. SIDORENKO, and E. N. GERASIMOVA (Akademiia Meditsinskikh Nauk SSSR, Moscow, USSR) Kardiologiya (ISSN 0022-9040), vol. 23, March 1983, p. 33-37. In Russian. refs

**A83-40545  
THE DIAGNOSTIC POSSIBILITIES OF MYOCARDIAL SCINTIGRAPHY USING TL-201 IN THE CASE OF ACUTE MYOCARDIAL INFARCTION [DIAGNOSTICHESKIE VOZMOZHNOСТИ STSINTIGRAFII MIKARDA TL-201 PRI OSTROM INFARKTE MIKARDA]**

A. A. KRAMER, P. K. KHADZHIDIS, I. S. DVOSKINA, A. Z. EVENTOV, A. I. DEMIDOV, and M. I. RUDA (Akademiia Meditsinskikh Nauk SSSR, Moscow, USSR) Kardiologiya (ISSN 0022-9040), vol. 23, March 1983, p. 46-51. In Russian. refs

**A83-40546  
THE CONDITION OF PERIPHERAL HEMODYNAMICS AND THE EFFECT ON IT OF SEVERAL DRUGS IN PATIENTS WITH CHRONIC ISCHEMIC HEART DISEASE AND LEFT VENTRICULAR INSUFFICIENCY [SOSTOIANIE PERIFERICHESKOI GEMODINAMIKI I VLIANIE NA NEE NEKOTORYKH LEKARSTV PRI LEVOZHELUDOCHKOVOI NEDOSTATOCHNOSTI U BOL'NYKH KHRONICHESKOI ISHEMICHESKOI BOLEZNI SERDTSIA]**

I. N. SHTEINGARDT, L. I. TIUKALOVA, V. A. MARKOV, V. I. KUN, and V. P. TSYMBALIUK (Tomskii Meditsinskii Institut, Tomsk, USSR) Kardiologiya (ISSN 0022-9040), vol. 23, March 1983, p. 91-95. In Russian. refs

**A83-40547  
THE ELEVATION OF THE ST SEGMENT DURING PHYSICAL LOADING: COMPUTER ANALYSIS, COMPARISON WITH ANGIOGRAPHIC DATA, AND CLINICAL SIGNIFICANCE [O POD'EME SEGMENTA ST PRI FIZICHESKOI NAGRUZKE - KOMPIUTERNYI ANALIZ, SOPOSTAVLENIE S DANNYMI ANGIOGRAFI, KLINICHESKOE ZNACHENIE]**

A. P. GOLIKOV, R. A. CHARCHOGLIAN, L. S. ZINGERMAN, S. P. LEVSHUNOV, and N. N. ESIN (Nauchno-Issledovatel'skii Institut Skoroi Pomoshchi, Moscow, USSR) Kardiologiya (ISSN 0022-9040), vol. 23, March 1983, p. 55-59. In Russian. refs

The causes of the elevation of the ST segment of the EKG during physical exercise on a treadmill were investigated in 41 male patients with anterior myocardial infarcts using ventriculography, sector scanning echocardiography, and angiography. Significant stenosis (75 percent of the lumen) of one coronary artery was found in 21 patients, of two coronary arteries in 10 patients, and of three coronary arteries in two patients, while the coronary arteries were intact in one patient. It is determined that elevations of the resting ST as recording from EKG leads with the QS complex is associated with aneurysms of the left ventricle in the majority of cases. The location of the exercise-induced elevation of the ST segment is found to correlate well with significant proximal stenosis of the corresponding coronary artery and is not dependent on the presence of a left ventricular aneurysm or on the number of injured arteries. In patients with transmural anterior myocardial infarcts, the elevation of the ST segment in response to physical loading is due to the dysynergy of the left ventricular wall, rather than to myocardial ischemia. N.B.

**A83-40548****THE EFFECT OF DISORDERS OF LIPID METABOLISM ON THE RHEOLOGICAL PROPERTIES OF BLOOD IN PATIENTS WITH ISCHEMIC HEART DISEASE [VLIANIE NARUSHENII LIPIDNOGO OBmena NA REOLOGICHESKIE SVOISTVA KROVI U BOL'NYKH ISHEMICHESKOI BOLEZNIU SERDTSIA]**

V. A. DUDAEV, A. S. PARFENOV, T. I. TORKHOVSKAIA, E. M. KHALILOV, A. S. IVANOV, V. N. NECHAEVA, M. V. SHINGEREI, and L. ZH. OMAR (II Moskovskii Gosudarstvennyi Meditsinskii Institut, Moscow, USSR) Kardiologiya (ISSN 0022-9040), vol. 23, March 1983, p. 37-42. In Russian. refs

The effect of an increased concentration of lipids of the erythrocyte membrane and blood serum on the rheological properties of blood (total blood and plasma viscosity, erythrocyte aggregation and deformability) was studied in 70 patients (40-75 years of age) with ischemic heart disease. Results show a positive correlation of the total blood and plasma viscosity with the level of serum triglycerides in patients with chronic forms of ischemic heart disease. However, increased levels of serum cholesterol were found not to affect the plasma viscosity in any significant manner. The deformability of erythrocytes was reduced in patients with ischemic heart disease in proportion to increases in the molar ratio of cholesterol/phospholipids in erythrocyte membranes.

N.B.

**A83-40549****THE EFFECT OF CALCIUM ON THE DIASTOLIC PHASES IN HEALTHY INDIVIDUALS AND IN PATIENTS WITH HEART FAILURE [VLIANIE KAL'TSIIA NA FAZY DIASTOLY U ZDOROVYKH I BOL'NYKH S SERDECHNOI NEDOSTATOCHNOST'IU]**

IA I. KOTTS and L. M. DIAKONOVA (Orenburgskii Meditsinskii Institut, Orenburg, USSR) Kardiologiya (ISSN 0022-9040), vol. 23, March 1983, p. 95-98. In Russian. refs

The changes in the length of the diastolic phases during the influence of acute calcium loading were studied in 18 healthy individuals and in 60 patients with heart failure of various stages using left ventricular apexcardiography. Results show that the phases of isometric relaxation, slow filling, and diastole are decreased in patients with heart failure in proportion to the severity of the heart failure. The lengths of the phases of rapid filling and atrial systole were increased. The calcium test revealed differences in the action of calcium on normal and diseased myocardia. It is suggested that the changes of the diastolic phases are connected with changes in the mechanisms of calcium fixation and its elimination from the sarcoplasmic reticulum.

N.B.

**A83-40550****THE EFFECT OF SEDUXEN ON HEMODYNAMIC REACTIONS IN PATIENTS WITH HYPERTENSION DURING EMOTIONAL STRESS [VLIANIE SEDUKSENA NA GEODINAMICHESKIE REAKTSII U BOL'NYKH GIPERTONICHESKOI BOLEZNIU PRI EMOTSIONAL'NOM NAPRIAZHENII]**

R. P. OLKHA, E. V. BELOVA, and I. Z. SHERES (Moskovskii Meditsinskii Stomatologicheskii Institut, Moscow, USSR) Kardiologiya (ISSN 0022-9040), vol. 23, March 1983, p. 71-76. In Russian. refs

The relationship of several parameters of blood circulation during mental activity in conditions of emotional stress was studied in 35 healthy individuals and in 90 patients with hypertension stages I-II using tetrapolar chest rheography and rheoencephalography. One hour before the investigation, 39 of these individuals were administered 5 mg of seduxen. Results show that seduxen does not prevent the hypertensive reaction during emotional stress. However, seduxen alters the character of the hemodynamic reactions to emotional stress in patients with hypertension so that it resembles the hemodynamic reactions exhibited by healthy individuals. In patients with hypokinetic reactions to emotional stress, seduxen restores the autoregulation of the cerebral vessels.

N.B.

**A83-40557****APPARENT MOVEMENT - PHENOMENOLOGY, MAIN DETERMINANTS, AND MECHANISMS [VIDIMOE DVIZHENIE - FENOMENOLOGIIA OSNOVNYE DETERMINANTY, MEKHAIZMY]**

IU. N. MIRTOV Voprosy Psikhologii (ISSN 0042-8841), Mar-Apr 1983, p. 130-138. In Russian. refs

A review is presented of psychological research concerning the apparent movement of visual images, the visual illusion of movement. The main determinants of the type and quality of the images showing apparent movement include the time of the exposition of the patterns, the time interval between the expositions of the patterns, the brightness of the patterns, and the size of the patterns. The conditions of the presentation of the stroboscopic stimulus (binocular, monocular, etc.) also play an important role in the perception of apparent movement. These factors are discussed in detail, focusing on situations with simple geometrical patterns on unstructured backgrounds.

N.B.

**A83-40562****THE REGULATION OF THE FUNCTIONS OF THE IMMUNE SYSTEM [REGULIATSIIA FUNKTSII IMMUNNOI SISTEMY]**

R. V. PETROV (Ministerstvo Zdravookhraneniia SSSR, Institut Biofiziki, Moscow, USSR) Arkhiv Patologii (ISSN 0004-1955), vol. 45, no. 4, 1983, p. 3-11. In Russian. refs

A review is presented concerning various aspects of the regulation of the immune system, including the regulation of immune response levels. Topics examined include the immunoglobulins and their structural genes; the regulatory cells of the immune system (T-helpers, T-suppressors, B-suppressors, and contrasuppressors); and the mediatory level of regulation by means of lymphokins, interleukins, and mediators of thymic and bone-marrow origin. Emphasis is given to the theory of idio-type-antidotype regulation (network theory), a new type of regulation of the cellular functions of the immune system.

N.B.

**A83-40566****HUMAN NUTRITION IN THE NORTH [PITANIE CHELOVEKA NA SEVERE]**

V. A. KONYSHEV, M. F. NESTERIN, and L. E. PANIN (Akademii Meditsinskikh Nauk SSSR, Moscow and Novosibirsk, USSR) Voprosy Pitaniia (ISSN 0042-8833), Mar-Apr 1983, p. 5-12. In Russian. refs

A review is presented of studies concerning the nutrition of the native populations of the Soviet Far North regions, of individuals who moved to the Far North to work, and of participants in Soviet expeditions to the Arctic and Antarctic regions. The main findings of these studies are compared with the results of research conducted by foreign investigators. Topics discussed include the amounts of fats, carbohydrates, and proteins which comprise the diets of native inhabitants of the Far North; the metabolism of individuals who move from lower latitudes to the Far North and how this compares with the metabolism of native inhabitants, and the types and distribution of caloric intake for individuals living in the Far North. Also examined are the extra need for certain vitamins during stays in the Far North, the changes in the water-electrolyte metabolism of individuals living in the Far North, and the types of nutrition provided by products native to the Far North.

N.B.

**A83-40568****PHENIBUT ELECTROPHORESIS AS A METHOD OF TREATING MUSCULAR SPASTICITY OF CENTRAL GENESIS [FENIBUT-ELEKTROFOREZ KAK METOD LECHENIIA MYSHECHNOI SPASTICHNOSTI TSENTRAL'NOGO GENEZA]**

IU. V. GOLDBLAT (Leningradskii Nauchno-Issledovatel'skii Psikhonevrologicheskii Institut, Leningrad, USSR) Voprosy Kurortologii, Fizioterapii i Lechebnoi Fizicheskoi Kul'tury (ISSN 0042-8787), Mar-Apr. 1983, p. 52-54. In Russian. refs

A83-40569

**AGE-RELATED PECULIARITIES OF THE FUNCTIONAL CONDITION OF THE VASCULAR SYSTEM IN PATIENTS WITH BRONCHIAL ASTHMA IN THE CASE OF MOUNTAIN-CLIMATE THERAPY [VOZRASTNYE OSOBENNOSTI FUNKTSIONAL'NOGO SOSTOIANIYA SOSUDISTOI SISTEMY U BOL'NYKH BRONKHIAL'NOI ASTMOI PRI LECHENII GORN'NYM KLIMATOM]**

M. N. IAKUSHENKO and E. A. SHOGENTSUKOVA (Kabardino-Balkarskii Gosudarstvennyi Universitet, Nalchik, USSR) Voprosy Kurortologii, Fizioterapii i Lechebnoi Fizicheskoi Kul'tury (ISSN 0042-8787), Mar.-Apr. 1983, p. 39-41. In Russian.

A83-40572

**HEREDITY, AGING, AND LONGEVITY OF HUMANS [NASLEDSTVENNOST', STARENIE I PRODOLZHITEL'NOST' ZHIZNI CHELOVEKA]**

V. P. VOITENKO (Akademiya Meditsinskikh Nauk SSSR, Kiev, Ukrainian SSR) Tsitologiya i Genetika (ISSN 0041-4883), vol. 17, Mar.-Apr. 1983, p. 65-73. In Russian. refs

A review is presented of recent research concerning the hereditary aspects of the functional, metabolic, and morphological features of aging and senility; the diseases of old individuals; and longevity. The relationship is examined between aging and certain hereditary diseases, such as progeria, which lead to hereditary manifestations of premature aging. The potential for prolonging the life of individuals and whole populations is discussed, focusing on the role of hereditary factors in aging. N.B.

A83-40574

**DISORDERS OF RENAL FUNCTION IN PATIENTS WITH TRAUMA OF THE SPINAL COLUMN AND SPINAL CORD [NARUSHENIYA FUNKTSII POCHEK U BOL'NYKH S TRAVMOI POZVONOCHNIKA I SPINNOGO MOZGA]**

V. I. KONDRATENKO and D. O. GVADA (Donetskii Meditsinskii Institut, Donetsk, Ukrainian SSR) Voprosy Neurokhirurgii (ISSN 0042-8817), Mar.-Apr. 1983, p. 38-42. In Russian. refs

A83-40578

**THE SIGNIFICANCE OF THE STRENGTH OF THE CENTRAL NERVOUS SYSTEM IN THE VARIABILITY OF THE REACTION IN SICK PERSONS TO ACEBUTOLOL [ZNACHENIE SILY TSENTRAL'NOI NERVNOI SISTEMY V VARIABEL'NOSTI REAKTSII BOL'NYKH NA ATSEBUTOLOL]**

I. P. ZAMOTAEV, E. T. LILIN, V. G. ABRAMOVA, and T. A. VAVILOVA (Tsentral'nyi Institut Uovershenstvovaniya Vrachey, Nauchno-Issledovatel'skii Institut po Biologicheskimi Ispytaniyam Khimicheskikh Soedinenii, Moscow, USSR) Sovetskaya Meditsina, no. 3, 1983, p. 24-28. In Russian. refs

The functional condition of the central nervous system (CNS) in patients with stage II hypertension was evaluated using several psychophysiological methods. The patients were divided into groups with weak and strong conditions of the CNS. Results show that the variability of the reactions of the patients to the hypertension drug acebutolol depends on the individual typological characteristics of the CNS. The initial condition of the CNS influences the speed of the normalization of physiological processes such as arterial pressure and heart rate. It is concluded that the strength of the CNS should be taken into account when evaluating the effectiveness of hypertension drugs. N.B.

A83-40579

**COMPUTER TOMOGRAPHY OF ORGANS OF THE ABDOMINAL CAVITY [KOMP'YUTERNAIA TOMOGRAFIYA ORGANOV BRIUSHNOI POLOSTI]**

V. N. SOKOLOV, R. I. GABUNIIA, A. S. LOGINOV, E. K. KOLESNIKOVA, and G. V. KUDRIAVTSEVA (Akademiya Meditsinskikh Nauk SSSR, Moscow, USSR) Sovetskaya Meditsina, no. 3, 1983, p. 59-64. In Russian

Results are presented for the use of CAT scanning in examinations of about 2000 patients with pathologies of the liver, bile ducts, gall bladder, and pancreas. The accuracy of the CAT method was evaluated by laparoscopy, liver and pancreas scans,

pancreatography, biopsies, and autopsies. The methods employed to obtain the CAT scans of the abdominal cavity are discussed in detail, and interpretations of the CAT scans for various types of pathologies are presented. It is determined that CAT scanning is an effective and objective method for studying the internal organs which can reveal the presence of tumors, cysts, and diffuse changes in the liver and pancreas. However, the correct interpretation of the CAT scans requires a knowledge of CAT scans for normal conditions of these organs, developmental differences, and anomalies. It is suggested that CAT scanning be used in conjunction with various other specialized methods of investigation. N.B.

A83-40580

**THE EFFECT OF LONG-ACTING NITRATES ON HEMODYNAMIC INDICATORS IN PATIENTS WITH ACUTE MYOCARDIAL INFARCTS [VLIYANIE NITRATOV PROLONGIROVANNOGO DEISTVIA NA POKAZATELI GEMODINAMIKI BOL'NYKH OSTRYM INFARKTOM MIOKARDA]**

R. M. ZASLAVSKAYA and Z. T. POKAZEEVA (Nauchno-Issledovatel'skii Institut po Biologicheskimi Ispytaniyam Khimicheskikh Soedinenii, Moscow, USSR) Sovetskaya Meditsina, no. 3, 1983, p. 3-7. In Russian. refs

A83-40581

**SEVERAL PECULIARITIES OF THE CYTOARCHITECTONICS OF THE MIDBRAIN TEGMENTUM OF HUMANS [NEKOTORYE OSOBENNOSTI TSITOARKHITEKTONIKI POKRYSHKI SREDNEGO MOZGA CHELOVEKA]**

L. IA. DOTSOEV and V. V. KUPRIANOV (II Moskovskii Meditsinskii Institut, Moscow, USSR) Arkhiv Anatomii, Gistologii i Embriologii (ISSN 0004-1947), vol. 84, March 1983, p. 5-9. In Russian.

The peculiarities of the cytoarchitectonics of the reticular formations of the midbrain tegmentum were investigated using 15 preparations of the midbrains of humans who died at 20-80 years of age. A new modification of the silver impregnation method was employed which fully revealed the multipolar nerve cells with their numerous branches. The clusters of nerve cells between and surrounding the oculomotor nerve nuclei were studied, which differ from the surrounding nerve tissue and from the oculomotor nerve nuclei by the density of the cellular distribution, and by their size and form, as well as because these clusters resemble the intramural vegetative nerve plexus. The multiprocessing form of the cells of the integrational plexus and its topographic connection with the oculomotor nerve nuclei complex were used to develop a hypothesis about the integrating function of this plexus in the system of the oculomotor nerve nuclei, which provides for the coordination of the activity of the voluntary and involuntary muscles of the eye. N.B.

A83-40583

**THE DEPENDENCE OF THE TOPOGRAPHY OF THE HEPATIC VEINS ON THE EXTERNAL FORM OF THE LIVER, ITS SIZES, AND AGE [ZAVISIMOST' TOPOGRAFIY PECHENOCHNYKH VEN OT VNESHNEI FORMY PECHENI, EE RAZMEROV I OT VOZRASTA]**

G. E. TSAI (Kalininskii Meditsinskii Institut, Kalinin, USSR) Arkhiv Anatomii, Gistologii i Embriologii (ISSN 0004-1947), vol. 84, March 1983, p. 34-40. In Russian. refs

A83-40585

**THE NEURAL APPARATUS OF THE CORONARY ARTERIES IN NORMAL CONDITIONS AND IN PATIENTS WITH ISCHEMIC HEART DISEASE [NERVNYI APPARAT VENECHNYKH ARTERII V NORME I V USLOVIYAKH ISHEMICHESKOI BOLEZNI SERDTSIA]**

G. V. STOVICHEK and I. U. G. STOVICHEK (Iaroslavskii Meditsinskii Institut, Iaroslavl, USSR) Arkhiv Anatomii, Gistologii i Embriologii (ISSN 0004-1947), vol. 84, March 1983, p. 9-16. In Russian. refs

A comparative analysis of morphometrical data was conducted in order to determine the pattern of the age variability of quantitative factors which characterize the anatomy of adventitial nerve

plexuses, and the architectonics and histochemistry of their nerves in the coronary arteries of healthy individuals and in patients with ischemic heart disease. It is determined that individuals who died as a result of ischemic heart disease exhibited an acceleration in the processes of the natural degeneration of the coronary arteries, inherent age involutions which were manifested by an acceleration of the quantitative loss of nerve trunks, decreases in the total concentration of myelin transmitters, and a thinning out of the network of cholinergic fibers. The decreasing number and eventual disappearance of high-differentiated thick and medium myelin fibers, along with changes in the enzymatic activity, act to produce new quantitative peculiarities in the innervational connections of the coronary arteries both in the process of ontogenesis and in conditions of ischemic heart disease N B

**N83-28012#** Joint Publications Research Service, Arlington, Va.  
**LEONOV DESCRIBES COSMONAUTS' LANDING, PHYSICAL CONDITION**

B KONOVALOV *In its* USSR Rept: Space, No 21 (JPRS-83430) p 1-3 9 May 1983 refs Transl. into ENGLISH from Nedelya (Moscow), no. 50, 13-19 Dec 1982 p 5  
Avail: NTIS HC A07

An overview and assessment of the post flight conditions of cosmonauts Anatoly Berezhovoy and Valentin Lebedev was presented. B.G

**N83-28018#** Joint Publications Research Service, Arlington, Va.  
**SPACE BIOLOGY AND MEDICINE IN INTERCOSMOS PROGRAM**

Y I. VOROBYEV and A. R. KOTOVSKAYA *In its* USSR Rept Space, No. 21 (JPRS-83430) p 45-51 9 May 1983 Transl. into ENGLISH from Zemlya i Vseleennaya (Moscow), no. 2, Mar - Apr. 1982 p 32-35  
Avail: NTIS HC A07

The results of the performed studies indicate that no serious psychological problems arose. This stability was achieved by understanding the motivations for activity, the effectiveness of psychological selection, satisfactory living conditions, a balanced work and rest regime, and also special measures with respect to psychological support. The probability of development and the symptoms of disorders connected with the acute period of adaptation of man to weightlessness, estimation of the psychological characteristics of fitness and estimation of certain methods and means of unfavorable influences of weightlessness were determined Author

**N83-28857** Michigan Univ., Ann Arbor  
**PARAMETRIC ANALYSIS OF DYNAMIC POSTURAL RESPONSES**  
**Ph.D. Thesis**

S. A. S. WERNES 1982 242 p  
Avail: Univ Microfilms Order No DA8225071

Since human postural control has the dynamic characteristics of a servo mechanism, a potentially useful clinical test is the monitoring and quantification of patient responses to induced disturbances of the base of support. Postural sway is monitored in the sagittal plane by digital line scan cameras sensing silhouette displacement at the waist and shoulders, while the subject stands on a platform capable of linear anterior-posterior translations. Trials are conducted with eyes open and eyes closed. The various stimuli applied to the platform include pseudorandom displacements, which are created by signaling the velocity controlled platform with bandlimited pseudorandom noise. The responses to pseudorandom stimuli of six normal subjects tested under different input amplitude and visual conditions have been quantified by deriving parametric linear systems transfer function plus noise models. Author

**N83-28858** Northwestern Univ., Evanston, Ill.  
**THEORETICAL AND EXPERIMENTAL DETERMINATION OF ARTERIAL PULSE PROPAGATION SPEED** Ph.D. Thesis

S. G. KARR 1982 203 p  
Avail: Univ Microfilms Order No. DA8225949

A novel transducer system is described that permits noninvasive, high fidelity recordings of the pressure-vs-time arterial profile at

any palpable site on the body. A thin (30 micron) piezoelectric polymer film of polyvinylidene fluoride serves as the active element and as the mechanical coupler to the skin. The complete system is designed to record four simultaneous profiles on a subject. The noninvasive contours and their first and second derivatives compare well to the simultaneously-recorded intra-arterial pressure pulses. The instrumentation is utilized to determine the pressure pulse-propagation speed, an indirect measure of arterial vessel compliance, from two simultaneously recorded pulse contours. The wave speed determination can be elusive and, therefore, fourteen methods for calculating wave speed are tested using model-generated simulated data. Model data provides a definitive test of the algorithms since the correct value of the wave speed is a known, input parameter. Dissert. Abstr.

**N83-28859** Defence Research Information Centre, Orpington (England).

**VISUAL PREVENTION OF MOTION SICKNESS IN CARS**

T. PROBST, S. KRAFCZYK, W. BUECHELE, and T. BRANDT Jan. 1983 21 p refs Transl. into ENGLISH of Archiv fuer Psychiat. und Nervenkrankheiten (West Germany), v 231, 1982 p 409-421 (DRIC-T-6823; BR86793) Avail: Issuing Activity

The differential effects of vision on motion sickness in cars were tested under real road conditions using linear accelerations, in order to confirm laboratory results on visual modulation of vestibular nausea induced by angular accelerations of the body. The 18 voluntary subjects were exposed to repetitive braking maneuvers (linear accelerations 0.1 to 1.2 g) on a highway. The simultaneous visual stimulus conditions were eyes open (visual control of car motion) eyes closed; and artificial stationary visual field (reading). The severity of motion sickness (magnitude estimation 1 to 10) was a function of the visual stimulus condition with significant differences among these conditions: moderate nausea (less than one) with adequate visual motion perception; medium nausea (about two) with eyes closed and somatosensory-vestibular excitation only, strong nausea (larger than five) with conflicting sensory input, when vestibular acceleration is in disagreement with the visual information of no movement. Providing ample peripheral vision of the relatively moving surroundings is the best strategy to alleviate car sickness. Author (ESA)

**N83-28860#** School of Aerospace Medicine, Brooks AFB, Tex.  
**BEHAVIORAL-PERFORMANCE EFFECTS FROM A HIGH-NEUTRON, LOW-GAMMA RADIATION PULSE EXPOSURE**  
**Final Report, Jun. - Dec. 1981**

G. C. BROWN, M. G. YOCHMOWITZ, K. A. HARDY, D. HUGHES, and B. YARBROUGH Dec 1982 51 p refs  
(Contract AF PROJ. 7757)  
(AD-A124777, SAM-TR-82-43) Avail: NTIS HC A04/MF A01  
CSCL 06H

A self-paced, 3-light, 3-lever discrete avoidance behavioral task was initiated to study the behavioral performance effects of a high-neutron, low-gamma radiation pulse exposure (550-650 rads, 5.5:1 n/g ratio). Eight rhesus monkey subjects performed the task for 4 hours (3 1/2 hours postexposure). The subjects were monitored daily for 3 days postexposure. For the exposure day only, five subjects had a decrease in correct responses, seven had increased reaction times, and six experienced productive emesis within 3 1/2 hours, although the performance degradations were not severe. An extrapolation to human performance indicates that time-critical tasks (e.g., aircraft landing on a carrier) could be significantly impaired Author (GRA)

**N83-28861#** Federal Aviation Administration, Washington, D.C.  
**Office of Aviation Medicine.**

**REGULATORY AVIATION MEDICINE IT PHILOSOPHIES AND LIMITATIONS**

G. NORWOOD and J. L. JORDAN Sep. 1982 10 p  
(AD-A124043; FAA-AM-82-14) Avail: NTIS HC A02/MF A01  
CSCL 06E

The application of aviation medicine is relatively standardized throughout the world, both in civil and military operations

Substantial differences exist, however, in the way different countries, or even different agencies in the same country, determine the medical qualifications of persons who wish to operate aircraft. As a rule, the medical certification policies of the Federal Aviation Administration (FAA) are more liberal than those imposed by the U.S. Department of Defense and by many foreign countries. Understanding the reasons for these differences requires an awareness of the characteristics of FAA's regulatory policy. Specifically, we must consider three aspects of that policy: (1) the certification system and its overall effects, (2) the philosophy of medical certification and standards, and (3) the limitations of the system  
GRA

**N83-28862#** Federal Aviation Administration, Washington, D.C. Office of Aviation Medicine.

### **PHYSIOLOGICAL STRESS IN AIR TRAFFIC CONTROLLERS: A REVIEW**

C. E. MELTON Aug. 1982 54 p refs  
(AD-A123853; FAA-AM-82-17) Avail: NTIS HC A04/MF A01  
CSCL 06S

Ten years of research on physiological stress in air traffic control specialists (ATCS's) is reviewed. Data were derived from 20 tasks involving the experimental variables of workload, shift-rotation patterns, and automation. Laboratories at the Civil Aeromedical Institute consisted of a survey of the quantity and quality of sleep in working ATCS's, a restudy of ATCS's several years after the first study to appraise stress change, and experimental attempts to evoke a differential response to two different qualities of stress. Stress was distinctly related to imposed workload as well as to working conditions. Differences in stress levels in ATCS's on different shift-rotation patterns were minimal. Automation gave rise to increased total stress accounted for by an increased workload incident to the changeover period from annual to computerized control techniques. A stress index was developed to facilitate comparison of physiological stress at the different air traffic control (ATC) facilities and among ATCS's. Anxiety level measurements vary minimally from facility to facility indicating little impact of ATC work on the psychological state of ATC's. These and other measures show that it is clearly inappropriate to describe ATC work, as is commonly done in the popular press, as being unusually stressful.  
GRA

**N83-28863#** Federal Aviation Administration, Washington, D.C. Office of Aviation Medicine.

### **FUNCTIONAL AGING IN PILOTS: AN EXAMINATION OF A MATHEMATICAL MODEL BASED ON MEDICAL DATA ON GENERAL AVIATION PILOTS**

J. O. BOONE Jun. 1982 10 p  
(AD-A123756; FAA-AM-82-18) Avail: NTIS HC A02/MF A01  
CSCL 06E

The purpose of this study was to apply mathematical procedures to the Federal Aviation Administration (FAA) pilot medical data to examine the feasibility of devising a linear numbering system such that; (1) the cumulative probability distribution functions (CPDF) for persons who are not diagnosed as having an acute pathology are lower on the scale than those diagnosed as having an acute pathology; and (2) the CPDF's for both groups overlap minimally. The analyses presented some pertinent results: (1) age is not as accurate in discriminating between the sudden incapacitating pathology and nonpathology groups as the linear discriminant composite. (2) As age increases from post-50, to post-55, to post-60, classification using the discriminant index increases monotonically; (3) better measures that predict these pathologies with more accuracy would further separate the CPDF's of the pathology and nonpathology groups. Based of these results a possible strategy for future study on pilot certification is discussed.  
GRA

**N83-28864#** Federal Aviation Administration, Washington, D.C. Office of Aviation Medicine.

### **G INCAPACITATION IN AEROBATIC PILOTS: A FLIGHT HAZARD**

W. R. KIRKHAM, S. M. WICKS, and D. L. LOWREY Oct 1982 35 p refs  
(AD-A123757; FAA-AM-82-13) Avail: NTIS HC A03/MF A01  
CSCL 06S

This report presents some historical perspectives of aerobatics and the physiological effects of G acceleration, especially as pertain to in-flight loss of consciousness (LOC) by the pilot. Several accidents and incidents are reviewed to illustrate that LOC occurs in some pilots during aerobatic maneuvers. Accelerometer recordings made during aerobatic performances are analyzed in regard to the G's acting on the pilot during the entire performance and during some specific maneuvers. Human tolerance to G's and specifically to changes from positive to negative G's and vice versa is discussed in regard to some published animal and human studies. This report suggests that oscillating G's as encountered in aerobatics tax the body's mechanisms to maintain blood perfusion of the brain and consciousness. Suggestions are given to help pilots reduce the physiological hazards of G's encountered in aerobatics.  
Author (GRA)

**N83-28865#** California Univ., Berkeley. Lawrence Berkeley Lab. Biology and Medicine Div.

### **HEAVY-ION RADIOGRAPHY AND HEAVY-ION COMPUTED TOPOGRAPHY**

J. I. FABRIKANT, W. R. HOLLEY, E. W. MCFARLAND, and C. A. TOBIAS Feb 1982 8 p refs Presented at the 3d Intern. Symp. of the Soc for Radiological Protection, Inverness, Scotland, 6-11 Jun. 1982  
(Contract DE-AC03-76SF-00098; CA-YO1-CB-40302)  
(DE82-012537; LBL-14001; CONF-820613-11) Avail: NTIS HC A02/MF A01

Heavy ion projection and CT radiography is being developed into a safe, low-dose, noninvasive radiological procedure that can quantitate and image small density differences in human tissues. The applications to heavy ion mammography and heavy ion CT imaging of the brain in clinical patients suggest their potential value in cancer diagnosis.  
DOE

**N83-28866#** California Univ., Berkeley. Lawrence Berkeley Lab. Biology and Medicine Div.

### **HEALTH EFFECTS IN WOMEN EXPOSED TO LOW LEVELS OF IONIZING RADIATION**

J. I. FABRIKANT Jun. 1982 27 p refs Presented at the Health Phys Soc. Ann. Meeting, Las Vegas, Nev., 27 Jun. - 1 Jul. 1982  
(Contract W-7405-ENG-48)  
(DE82-018620; LBL-14198; CONF-820655-4) Avail: NTIS HC A03/MF A01

There are three delayed health effects of radiation which appear at the present time to have importance to women in radiation protection. These are: (1) the probability of cancer induction at low doses and low dose rates; (2) the consideration of those cancers in women, notably the breast and the thyroid, attributable to radiation exposure; and (3) the probability of induction of developmental abnormalities in the newborn following low dose exposure in utero. The bases for the concern over these effects are discussed.  
DOE

**N83-28867#** California Univ., Berkeley. Lawrence Berkeley Lab.

**DYNAMIC POSITRON-EMISSION TOMOGRAPHY IN MAN USING SMALL BISMUTH GERMANATE CRYSTALS**

S. E. DERENZO, T. F. BUDINGER, R. H. HUESMAN, and J. L. CAHOON Apr. 1982 14 p refs Presented at 6th Intern. Conf. on Positron Annihilation, Fort Worth, Tex., 3-7 Apr. 1982 (Contract W-7405-ENG-48) (DE82-014997; LBL-14308; CONF-820434-8; CONF-820456-1) Avail NTIS HC A02/MF A01

Primary considerations for the design of positron emission tomographs for medical studies in humans are the need for high imaging sensitivity, whole organ coverage, good spatial resolution, high maximum data rates, adequate spatial sampling with minimum mechanical motion, shielding against out the plane activity, pulse height discrimination against scattered photons, and timing discrimination against accidental coincidences The choice of detectors, sampling motion, shielding, and electronics to meet these objectives are discussed DOE

**N83-28868#** Fraunhofer-Inst. fuer Toxikologie und Aerosolforschung, Schmallenberg-Grafschaft (West Germany). **INVESTIGATION OF THE TRANSPORT STABILITY OF INHALABLE SYNTHETIC MINERAL FIBERS (GLASS FIBERS, ETC.) IN COMPARISON WITH ASBESTOS Final Report, May 1981**

F. POTT, K. SPURNY, H. OPIELA, J. SCHOERMANN, and G. WEISS Bonn Bundesministerium fuer Forschung und Technologie Mar. 1983 194 p refs In GERMAN; ENGLISH summary Sponsored by Bundesministerium fuer Forschung und Technologie (BMFT-FB-HA-83-003; ISSN-0171-7618) Avail: NTIS HC A09/MF A01; Fachinformationszentrum, Karlsruhe, West Germany DM 36

A safe composition of synthetic fibers which would not cause a health hazard was investigated. For analysis of small amounts of fibers as well as for analysis of single fibers, analytical transmission electron microscopy, laser-induced mass spectrometry and proton-induced X-ray fluorescence are found to be the most useful methods. Results show that the glass fibers and man made mineral fibers are not resistant to caustic solutions and only partially resistant to acids. In solution they lose alkali and alkali earth elements, and their surface becomes corroded Glass and other synthetic mineral fibers similar to chrysotile asbestos are instable and after longer exposures in biological environments undergo chemical changes. Author (ESA)

**N83-28869#** Medical Physics Inst. Utrecht (Netherlands). **ACTIVITIES REPORT ON MEDICAL RESEARCH IN THE NETHERLANDS Progress Report, 1982**

W. T. VANBEEKUM, ed., B. VANEIJNSBERGEN, ed., and A. KAMP, ed Dec. 1980 255 p refs (PR-8) Avail: NTIS HC A12/MF A01

Brain, heart and lungs, and biomedical instrumentation research is summarized. Topics include: preparation of and measurement in brain slices; EEG monitoring; blood pressure measurement; and external fixator design. Author (ESA)

**N83-28870#** Wisconsin Univ., Madison. Clinical Science Center.

**RESEARCH, DEVELOPMENT AND EVALUATION OF SYSTEMS FOR NON-INVASIVE DETECTION AND QUANTIFICATION OF ATHEROSCLEROTIC LESIONS IN PERIPHERAL AND CORONARY ARTERIES**

C. A. MISTRETTA and W. ZARNSTORFF Dec. 1982 44 p refs (Contract N01-HV-12905) (PB83-157487; NIH-DT-WIS-82) Avail: NTIS HC A03/MF A01 CSCL 06L

Systems for noninvasive detection and quantification of atherosclerotic lesions in peripheral and coronary arteries were studied. Activities in three areas are summarized (1) investigation of Combined-Energy-Time (Hybrid) Subtraction; (2) construction of

a new digital video processor; (3) investigation of various techniques for implementing a digitally controlled beam attenuator. Future directions in each of these areas are described Author

**N83-29986#** Joint Publications Research Service, Arlington, Va. **USE OF MAGNETS IN MEDICAL TREATMENT**

A. ALIYEV In its USSR Rept.: Life Sci. Effects of Nonionizing Electromagnetic Radiation, No. 10 (JPRS-83745) p 61-70 23 Jun. 1983 Transl. into ENGLISH from Vyshka (USSR), 10 Feb. 1983 p 4 Avail: NTIS HC A04

In connection with the successes achieved in space biology and biophysics in the sixties research in this area has sharply increased. This research is concerned with a wide range of questions, including the medical use of a magnetic field, magneto-hygiene, magnetopharmacology, biomagnetism and others. Clinical experimental research has established that a constant magnetic field and a low frequency alternating magnetic field possess analgesic, antiedematous and antifebril action, decrease dystrophic processes, and increase blood circulation. B.W.

**N83-29987#** Joint Publications Research Service, Arlington, Va. **GENETIC DANGER OF NON-THERMAL INTENSITY MICROWAVE WAVES AND ITS HYGIENIC ASPECTS**

M. G. SHANDALA, Y. N. ANTIPENKO, I. V. KOVESHNIKOVA, and O. I. TIMCHENKO In its USSR Rept. Life Sci. Effects of Nonionizing Electromagnetic Radiation, No. 10 (JPRS-83745) p 64-70 23 Jun. 1983 refs Transl. into ENGLISH from Gig. Sanit (USSR), no 10, Oct. 1982 p 38-41 Avail NTIS HC A04

The aim of the present study was experimental clarification of the possibility of a modifying effect of microwave EMF's (2375 MHz) of nonthermal intensities on a number of cells with chromosomal aberrations in an integral organism of mammals. Author

**N83-29988** Defence Research Information Centre, Orpington (England).

**TREATMENT OF HYPOTHERMIA IN A SEAMAN FOLLOWING THE SHIPWRECK OF A COASTAL MOTORSHIP**

A. LOWE and H. GOETHE Feb. 1983 28 p refs Transl into ENGLISH from Med. Welt (West Germany), v. 32, no. 21, 1981 p 828-835 (DRIC-T-6835; BR87061) Avail: Issuing Activity

The accident, hypothermia, rescue and transport, treatment, temperature and therapy records analysis, parameter analysis, ECG, clinical laboratory data, drugs, neurological and physiotherapeutic treatment, and current state of health are reported. Author

**N83-29989\*** National Aeronautics and Space Administration, Washington, D. C.

**AEROSPACE MEDICINE AND BIOLOGY: A CONTINUING BIBLIOGRAPHY WITH INDEXES (SUPPLEMENT 247)**

Jul. 1983 65 p (NASA-SP-7011(247); NAS 1.21:7011(247)) Avail NTIS HC A04 CSCL 06E

This bibliography lists 269 reports, articles and other documents introduced into the NASA scientific and technical information system in June 1983 Author

**N83-29990** National Physical Lab., Teddington (England). Div. of Materials Applications

**BIOMECHANICS OF HEAD TOLERANCE CRITERIA**

F. J. LOCKETT Apr. 1983 20 p refs (Contract TRRL-90/1297) (NPL-DMA(A)64; ISSN-0143-7313) Avail: Issuing Activity

A biomechanics analysis of head impact was performed, and damage criteria were derived It is shown that the Gadd, severity, and head injury (HIC) criteria are adequate. It is correct to express the tolerance criterion as a correlation between injury and acceleration. There is no ambiguity in deciding which point within



the head (center of gravity or elsewhere) the acceleration refers to. Criteria can involve integrations over all, or only part of, the duration of the acceleration pulse. Injuries due to wave propagation are not controlled by the Gadd, severity and HIC criteria. Criteria are required to guard against these injury mechanisms and against rotation effects.

Author (ESA)

**N83-29991\*#** National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.

**NON-INVASIVE METHOD AND APPARATUS FOR MEASURING PRESSURE WITHIN A PLIABLE VESSEL Patent Application**

M. SHIMIZU, inventor (to NASA) (NAS-NRC) 10 Feb. 1983 14 p Sponsored by NASA

(NASA-CASE-ARC-11264-2; US-PATENT-APPL-SN-465370)

Avail: NTIS HC A02/MF A01 CSCL 06B

A non-invasive method and apparatus is disclosed for measuring pressure within a pliable vessel such as a blood vessel. The blood vessel is clamped by means of a clamping structure having a first portion housing a pressure sensor and a second portion extending over the remote side of the blood vessel for pressing the blood vessel into engagement with the pressure sensing device. The pressure sensing device includes a flat deflectable diaphragm portion arranged to engage a portion of the blood vessel flattened against the diaphragm by means of the clamp structure. In one embodiment, the clamp structure includes first and second semicylindrical members held together by retaining rings. In a second embodiment the clamp structure is of one piece construction having a solid semicylindrical portion and a hollow semicylindrical portion with a longitudinal slot in the hollow semicylindrical portion through which a slip the blood vessel. In a third embodiment, an elastic strap is employed for clamping the blood vessel against the pressure sensing device.

NASA

**N83-29992\*#** Federation of American Societies for Experimental Biology, Bethesda, Md. Life Sciences Div.

**RESEARCH OPPORTUNITIES IN CARDIOVASCULAR DECONDITIONING, PHASE 1 Final Report**

M. N. LEVY, ed and J. M. TALBOT, ed. Washington NASA Jul. 1983 82 p refs

(Contract NASW-3616)

(NASA-CR-3707; NAS 1 26:3707) Avail: NTIS HC A05/MF A01 CSCL 06P

The deconditioning of the cardiovascular system that occurs during spaceflight, NASA's current and projected research program, and the conclusions and suggestions of the ad hoc Working Group are summarized.

Author

**N83-29993\*#** Federation of American Societies for Experimental Biology, Bethesda, Md. Life Sciences Research Office.

**RESEARCH OPPORTUNITIES IN SPACE MOTION SICKNESS, PHASE 2 Final Report**

J. M. TALBOT Washington NASA Jul. 1983 64 p refs

(Contract NASW-3616)

(NASA-CR-3708; NAS 1 26:3708) Avail: NTIS HC A04/MF A01 CSCL 06S

Space and motion sickness, the current and projected NASA research program, and the conclusions and suggestions of the ad hoc Working Group are summarized. The frame of reference for the report is ground-based research.

Author

**N83-29994#** Civil Aeromedical Inst., Oklahoma City, Okla. Office of Aviation Medicine.

**EFFECTS OF SOME MOTION SICKNESS SUPPRESSANTS ON TRACKING PERFORMANCE DURING ANGULAR ACCELERATIONS**

D. J. SCHROEDER, W. E. COLLINS, and G. W. ELAM Oct. 1982 21 p refs

(AD-A123839; FAA-AM-82-19) Avail: NTIS HC A02/MF A01 CSCL 06S

The two studies reported here examined the influence of three established anti-motion sickness drugs on tracking performance in static (stationary) and dynamic (angular acceleration) conditions and on visual fixation ability during motion. In Study I, 40 young

men were randomly assigned in equal numbers to either a control (lactose placebo), dimenhydrinate (50 mg), promethazine hydrochloride (25 mg), or mixture (25 mg promethazine plus 10 mg d-amphetamine) group. Study 2 used 30 new subjects equally divided into control, dimenhydrinate (100 mg), and promethazine (50 mg) groups. Following practice, tests were conducted prior to 1, 2, and 4 hours after drug ingestion. The depressant drugs had little effect on static tracking, but impaired dynamic tracking performance and reduced ability to maintain visual fixation on a localizer/glide slope instrument due to increased ocular nystagmus. The mixture of promethazine and d-amphetamine produced none of these deleterious effects.

GRA

**N83-29995#** Army Research Inst. of Environmental Medicine, Natick, Mass.

**PROCEDURES FOR THE MEASUREMENT OF ACUTE MOUNTAIN SICKNESS**

J. B. SAMPSON, A. CYMERMAN, R. L. BURSE, J. T. MAHER, and P. B. ROCK 17 Feb 1983 34 p refs

(AD-A126280; USARIEM-M-8/83) Avail: NTIS HC A03/MF A01 CSCL 06S

Although acute mountain sickness (AMS) has been studied for well over a century, a standard measure or index of the degree of illness for use in experimental research does not exist. This paper outlines a definition and procedures for an operational measurement of AMS using the Environmental Symptoms Questionnaire (ESQ). Fifty-eight men completed over 650 ESQs during a one to three week stay atop Pike's Peak (4300m). Factor analysis produced nine distinct symptom groups, with two factors representing AMS. The first factor contains symptoms indicative of cerebral hypoxia and is labeled AMS-C. The second reflects respiratory distress and is called AMS-R. Signal detection theory was used to establish a criterion score value for each factor. Standard deviation values were used to derive indices of sickness severity. Discussion is given to the possible relationships between the two types of AMS and the more serious conditions of cerebral and pulmonary edema.

Author (GRA)

**N83-29996#** JAYCOR, Del Mar, Calif.

**A THEORETICAL ANALYSIS OF THE OBSERVED CALCIUM ANOMALIES CONCOMITANT WITH THE INTERACTION OF LOW INTENSITY ELECTRIC FIELDS WITH CEREBRAL TISSUE**

J. D. BOND and C. A. JORDAN 31 Dec 1982 67 p refs

(Contract N00014-81-C-0449)

(AD-A126284) Avail: NTIS HC A04/MF A01 CSCL 06R

We have developed an analytical model that describes certain aspects of the displacement of divalent calcium ions,  $\text{Ca}^{+2}$ , from the surface of biological tissue exposed to radio frequency radiation. This model explicitly provides a means of quantifying certain ideas that have heretofore been suggested by others, but only in a qualitative sense, as providing a basis for  $\text{Ca}^{+2}$  ion displacement. A detailed description of the conceptual basis as well as the analytical framework and examples of how this model can be tested are discussed in Sections 2 and 3 of this final report. A review of the scientific literature devoted to developing theoretical concepts to explain the coupling of radio frequency electromagnetic fields to biological membranes is presented as Section 4 of this report.

GRA

**N83-29997#** Army Research Inst. of Environmental Medicine, Natick, Mass. Heat Research Div.

**CHRONIC CONSUMPTION OF A LOW SODIUM DIET: HORMONAL AND PHYSIOLOGICAL EFFECTS DURING EXERCISE IN THE HEAT**

R. FRANCESCONI, R. W. HUBBARD, and M. MAGER 26 Jan. 1983 22 p refs

(Contract DA PROJ 3M1-61102-BS-10)

(AD-A124936; M7/83) Avail: NTIS HC A02/MF A01 CSCL 06S

To elucidate the effects of sodium deficiency on the ability to work in the heat, immature rats were fed a diet deficient in sodium for approximately 2 months. Rates of weight gain were severely affected in the  $\text{Na}^{+}$  deficient rats although fluid consumption

was unaffected. The low Na<sup>+</sup> diet effected no alterations in endurance or weight loss during exercise in the heat to hyperthermic exhaustion, but final core and skin temperatures were significantly reduced in the low Na<sup>+</sup> group and hemotocrit ratios were significantly increased. Circulating Na(+) and potassium levels were significantly increased in both groups after hyperthermic exhaustion. In the Na(+) deficient groups, plasma levels of both aldosterone and cortisol/corticosterone were significantly increased, and these increments were exacerbated following exercise to hyperthermic exhaustion. Consumption of the low Na(+) diet elicited significant increments in circulating levels of lactate and creatinine, both of which were increased further after exercise. Circulating glucose was unaffected by consumption of the sodium deficient diet but declined in this group following exercise. Urea nitrogen and lactic acid dehydrogenase were increased after exercise but unaffected by the low sodium diet. Additional experiments are planned to elucidate further the metabolic and physiologic effects of chronic ingestion of a low Na(+) diet.

Author

**N83-29998#** Rochester Univ., N. Y. Dept. of Medicine and Radiation Biology

**MICROWAVES AND HUMAN LEUKOCYTE FUNCTION Final Report, 10 May 1981 - 15 Nov. 1982**

N. J. ROBERTS, JR., S. T. LU, and S. M. MICHAELSON Dec. 1982 16 p refs

(Contract F33615-81-K-0616, AF PROJ 7757)

(AD-A124000; SAM-TR-82-41) Avail NTIS HC A02/MF A01 CSCL 06R

Cell source and collection of blood, exposure and sham-exposure to microwaves, assays of leukocyte viability, assays of DNA, RNA, and total protein synthesis, assays of interferon production, and statistical analysis are addressed. Leukocyte viability; DNA, RNA, and total protein synthesis, and interferon synthesis are discussed.

Author

**N83-29999#** Illinois Univ., Champaign. Lab. for Cognitive Psychophysiology

**THE EVENT RELATED BRAIN POTENTIAL AS AN INDEX OF INFORMATION PROCESSING, COGNITIVE ACTIVITY, AND SKILL ACQUISITION: A PROGRAM OF BASIC RESEARCH Annual Progress Report, 1 Sep. 1981 - 30 Oct. 1982**

E. DONCHIN, C. WICKENS, and M. G. H. COLES Nov 1982 159 p refs

(Contract F49620-79-C-0233, AF PROJ 2313)

(AD-A125699; AFOSR-83-0051TR; CPL82-2) Avail NTIS HC A08/MF A01 CSCL 05J

The materials assembled in this report represent work conducted with AFOSR support at the Cognitive Psychophysiology Laboratory during the reporting period. Articles discussed in this report follow: Cognitive Psychophysiology and Preparatory Processes: A Case Study, A New Method for Off-Line Removal of Ocular Artifact; The Performance of Concurrent Tasks: A Psychophysiological Analysis of the Reciprocity of Information Processing Resources; P300 and Memory: Individual Differences in the von Restorff Effect, N200 Amplitude as a Function of Degree of Mismatch in a Word Categorization Paradigm, P300 Latency and Reaction Time from a Visual Search Task with Varying Levels of Noise and S-R Compatibility, Electrophysiology of Absolute Pitch, Information Extraction and P300 Amplitude; Operator Workload as a Function of the System State: An Analysis Based upon the Event-Related Brain Potential; Pseudo-Quickening: A New Display Technique for the Control of Higher Order Systems; and An Investigation of Redundant Auditory Tracking.

GRA

**N83-30000#** New Hampshire Univ., Durham Vision Research Lab

**SPATIAL AND TEMPORAL VISUAL MASKING AND VISIBILITY Annual Report for FY 1982**

R. A. SMITH 1 Oct. 1982 32 p refs

(Contract AF-AFOSR-0045-80; AF PROJ 2313)

(AD-A125696; AFOSR-83-0050TR; AR-1) Avail NTIS HC

A03/MF A01 CSCL 05J

Substantial evidence supports the hypothesis that visual detection in the presence of masking noise occurs at a constant signal/noise ratio only if the subject is unfamiliar with the mask. A variety of studies of the proposed sustained/transient mechanism model have failed to find support for a dichotomous visual system, and have failed to replicate some of the classical studies in this area. Studies of hypothetical velocity tuned channels suggest the possible existence of such channels, but show that they are, at best, mixed in their tuning properties. Weisstein's Pixel Flicker technique has been found to be an artifact of an unrealistic algorithm for adding noise to a visual scene. Other temporal enhancement schemes show some promise.

GRA

**N83-30001#** Cambridge Univ. (England) Dept. of Experimental Psychology.

**COLOR VISION CONFERENCE Final Report, 15 Jun. 1982 - 15 Mar. 1983**

J. D. MOLLON, ed 15 Mar 1983 12 p Conf held in Cambridge, England. Submitted for publication.

(Contract N00014-82-G-0111; WR04101001, RR0420902; NR

PROJ. 197-075)

(AD-A125435) Avail: NTIS HC A02/MF A01 CSCL 06P

A conference was organized that brought together 133 research scientists of diverse specialties to address a comprehensive review of the experimental and theoretical advances in color vision and to consider their application to the design of color-coding and color displays.

GRA

**N83-30002#** Naval Submarine Medical Research Lab., Groton, Conn

**CO2 RETENTION AND ECG CHANGES IN EXERCISE DURING PROLONGED HYPERBARIC N2-O2 BREATHING Interim Report**

K. E. SCHAEFER, J. H. DOUGHERTY, JR., J. M. WILSON, R. L. FRAYRE, and D. R. KNIGHT 30 Nov. 1982 26 p refs

(AD-A125403; NSMRL-956) Avail: NTIS HC A03/MF A01

CSCL 06S

Respiratory function (VE, VO2, VCO2, r and PACO2) was measured in the subjects at rest and exercise during prolonged hyperbaric chamber exposure to 2.52, 2.82, 4.03, and 7.00 atmospheres absolute (ATA). At 4.03 ATA, the ventilatory response to exercise was found depressed at 150 watts. Increased PACO2 indicated CO2 retention. At 7.00 ATA there was a slight but significant elevation of PACO2 at rest and a depression of the ventilatory response to exercise at both 50 and 125 watts associated with a marked CO2 retention. Arrhythmias were found at 4.03 and 7.00 ATA with workloads of 150 and 125 watts, respectively. At 4.03 ATA, premature atrial contractions (PAC) were noted at 150 watts in two subjects during four separate testing sessions. At 7.00 ATA, PAC's were observed at 125 watts in two subjects. One subject developed premature ventricular contractions (PVC's) during three different tests at 125 watts. Arrhythmias occurred only in those exercise tests which produced a marked CO2 retention at increased pressure.

Author (GRA)

**N83-30003#** Naval Submarine Medical Research Lab., Groton, Conn. Biomedical Sciences Dept.  
**WORKSHOP ON DETECTION AND MEASUREMENT OF PULMONARY OXYGEN TOXICITY**  
 C. J. LAMBERTSEN, R. G. ECKENHOFF, and J. W. PARKER  
 28 Jan. 1983 38 p refs Workshop held at Groton, Conn., 27-28 Oct. 1981  
 (Contract N00014-75-C-0348)  
 (AD-A125821; NSMRL-980) Avail NTIS HC A03/MF A01  
 CSCL 06S

As part of this laboratory's continuing research in shallow air saturation diving in support of the Navy's submarine rescue capability, several military and civilian scientists met for two days to discuss pulmonary oxygen toxicity and the various methods of its detection and quantification. The pathogenesis, biochemistry, and characteristics of the disease in both animals and humans were reviewed and discussed at length. Methods ranging from conventional spirometry to nuclear magnetic resonance to expired gas chemoluminescence were presented. Specific recommendations and limitations of the techniques were obtained concerning the application of these techniques to humans in a hyperbaric environment. The need for additional data concerning the progression and recovery from pulmonary oxygen toxicity in both man and animals was apparent during this workshop.

Author (GRA)

**N83-30004#** Army Research Inst. of Environmental Medicine, Natick, Mass. Heat Research Div.  
**SURVEY AND ANALYSIS OF THE HEAT CASUALTY PREVENTION EXPERIMENT FOR RESPIBLEX 1-81, OPERATION 'LANCER EAGLE', 43D, MAU**  
 R. W. HUBBARD, W. MATTHEW, and D. WRIGHT 12 Jul. 1982  
 28 p  
 (AD-A125847; USARIEM-T5/82) Avail NTIS HC A03/MF A01  
 CSCL 06S

This report describes the results of a heat casualty prevention experiment conducted in cooperation with reserve elements of the 43D Marine Amphibious Unit, during a training exercise, Operation Lancer Eagle, which took place at Little Creek, VA and Camp Lejeune, NC in July, 1981. The purpose of the experiment was to evaluate, under field conditions, the effectiveness of a revised approach to the prevention of heat casualties. Four companies of Marines were selected to participate. Two companies (220 men) served as 'controls' and received whatever hot weather training had been provided through routine channels. The two 'test' companies (306 men) received a thorough briefing on the elements of the Provisional Heat Doctrine and were instructed in the proper use of the Botsball to obtain accurate measurements of local heat stress levels. The 'test' companies were also given a reference card which provided a specific schedule for water intake and work/rest cycles depending on the measured heat stress.

GRA

**N83-30005#** Oak Ridge National Lab., Tenn. Information Div.  
**TOXICOLOGY INFORMATION RESPONSE CENTER: A TEN-YEAR PERSPECTIVE**  
 C. OEN, S. G. WINSLOW, and H. B. GERSTNER 1982 13 p refs Presented at the Am. Soc. for Inform. Sci. Mid-Year Meeting, Knoxville, Tenn., 13 Jun. 1982  
 (Contract W-7405-ENG-26)  
 (DE82-017430; CONF-820624-3) Avail NTIS HC A02/MF A01

The Toxicology Information Response Center (TIRC) recently completed its first decade of work. The founding of the center coincided with a growing national concern about chemicals in the environment and their potential deleterious effects upon human populations. This paper discusses the concept, design, and the evolution of TIRC's products and services as they relate to trends in the user community, the increase in toxicology-related literature, and regulatory and media interest in specific areas of toxicology. Advances in information science and technology are discussed as to their potential positive impact on the future of TIRC and its continuing growth.

DOE

**N83-30006#** Brookhaven National Lab., Upton, N. Y.  
**FACILITY FOR IN-VIVO MEASUREMENT OF LITHIUM**  
 D. VARTSKY, L. WIELOPOLSKI, K. J. ELLIS, and S. H. COHN  
 1982 5 p refs Presented at the Workshop on Uses of Nucl. Anal. Methods in Metal Toxicology, Upton, N.Y., 11 Oct. 1982  
 (DE83-007388; BNL-32266; CONF-8210106-3) Avail: NTIS HC A02/MF A01

A method for in-vivo measurement of Li levels in the human brain and other organs of interest such as the kidney is presented.  
 DOE

**N83-30007#** Institute of Applied Physiology and Medicine, Seattle, Wash.  
**ULTRASONIC IMAGING DEVELOPMENT Final Report, Jun. 1978 - Sep. 1980**  
 J. M. REID 11 Jun. 1982 34 p refs  
 (Contract N01-HV-2926-2)  
 (PB83-155994; NIH-N01-HV-2926-2) Avail NTIS HC A03/MF A01 CSCL 06B

This investigation has been directed toward producing a Doppler arterial imaging system for the detection and quantitation of atherosclerosis that is faster to use and more certain in the interpretation than the present system. Work has been accomplished in three major tasks: (1) The development of an automatic line scanning system so the data can be collected rapidly and to allow use of multiple plane images for more certain diagnosis; (2) the construction of a new pulse-Doppler system for producing biplane images of the carotid bifurcation so that the missing depth coordinate can be assessed for utility. This system has been constructed and tested, and an image has been obtained to illustrate the format; (3) the development of a physiological interpretive display for presenting data presently obtained by the ear-brain combination of the observer on the screen in the form of a color map.

GRA

## 53

### BEHAVIORAL SCIENCES

Includes psychological factors; individual and group behavior, crew training and evaluation, and psychiatric research.

**A83-38203**  
**VITAL QUESTIONS OF THE PSYCHOPHYSIOLOGICAL TRAINING OF PILOTS [AKTUAL'NYE VOPROSY PSIKHOFIZIOLOGICHESKOI PODGOTOVKI LETNOGO SOSTAVA]**

N. I. FROLOV and I. V. SHMELEV Voenno-Meditsinskii Zhurnal (ISSN 0026-9050), March 1983, p. 77, 78. In Russian.

A summary is presented of various topics discussed at a conference of specialists in aviation medicine held in Moscow in 1982 which addressed problems of the psychophysiological training of pilots. It was noted at this conference that the goal of the psychophysiological training of pilots is to increase the resistance of the body to the effects of various factors encountered during flying. Also emphasized was that contemporary technology has nearly completely removed the harmful effects of high altitude factors on pilots by using measures such as hermetically sealed cabins, oxygen breathing apparatus, and high altitude equipment. In addition, it was stated that the training of pilots in mock-ups increased their psychophysiological reserves and the reliability of their actions.

N.B.

A83-38614

**PARALLEL VERSUS SERIAL PROCESSING IN RAPID PATTERN DISCRIMINATION**J. R. BERGEN and B. JULESZ (Bell Telephone Laboratories, Inc., Murray Hill, NJ) *Nature* (ISSN 0028-0836), vol. 303, June 23, 1983, p. 696-698. refs

When stimuli are available for just a brief period (approximately 100 ms) only restricted spatial information can be processed by the visual system. If the stimuli are presented very briefly, eye movements are not possible. The time during which the after-image of the stimulus is available for inspection is terminated by presentation of a masking pattern. It is shown that in these conditions a small pattern is easily detected against a background made up of many others, only if this target pattern differs from the background patterns in certain local features. In this case the detectability of the target is almost independent of the number of background elements, suggesting that a parallel process is operating. Detection of patterns not differing from their backgrounds in such features requires focal attention which is a serial process. The aperture of this attention is scaled to minimize the number of shifts of attention required. Author

A83-39042

**PILOT JUDGMENT - CURRENT DEVELOPMENTS IN EVALUATION AND TRAINING AND FUTURE ISSUES IN AVIATION CASES**M. J. PANGIA *Journal of Air Law and Commerce* (ISSN 0021-8642), vol. 48, Winter 1983, p. 237-262. refs

The exercise of good pilot judgment is neither taught nor assessed in present flight training curricula. Attention is presently given to the need to further study and characterize the pilot judgment process, in order to reduce accident rates through appropriately modified training techniques. An account is also given of progress made toward this end to date, and of the possible consequences of such training for the development of aviation law. Hazardous pilot thought patterns identified by Embry and Riddle (1980) include impulsivity, a sense of invulnerability, resentment of authority, machismo, and a feeling of helplessness before external control. O.C.

A83-39934

**EFFECTS OF SEROTONIN ON MEMORY IMPAIRMENTS PRODUCED BY ETHANOL**H. WEINGARTNER, M. V. RUDORFER (U.S. Public Health Service, National Institute of Mental Health, Bethesda, MD), M. S. BUCHSBAUM (California, University, Irvine, CA), and M. LINNOILA (U.S. Public Health Service, National Institute on Alcohol Abuse and Alcoholism, Bethesda, MD) *Science* (ISSN 0036-8075), vol. 221, July 29, 1983, p. 472-474. refs

Subjects treated with low or high doses of ethanol demonstrated impaired memory, particularly in tests involving the recall of poorly learned information. Zimelidine, an inhibitor of serotonin reuptake, reversed this ethanol-induced impairment. The serotonin neurotransmitter system may mediate learning and memory in humans and may determine some of the effects of alcohol on higher mental functions. Author

A83-39940

**SUBJECTIVE PILOT WORKLOAD ASSESSMENT**J. T. REHMANN, E. S. STEIN, and B. L. ROSENBERG (FAA, Technical Center, Atlantic City, NJ) *Human Factors* (ISSN 0018-7208), vol. 25, June 1983, p. 297-301. refs

Traditional subjective pilot workload measures have stressed postflight questionnaires. An alternative method that is less dependent on memory was evaluated in two experiments. In the first study, pilots and nonpilots made workload evaluations each minute during a critical tracking task. Results indicate that their responses were directly related to the experimentally controlled difficulty level, whereas posttask questionnaire responses were much less accurate. In a second study, the workload assessment device was introduced into the cockpit of a general aviation cockpit simulator, to determine if pilots could differentiate between three flights in which the level of difficulty varied. It was found that pilot

workload judgments and response latencies were related to the experimentally induced difficulty level. As hypothesized, the more difficult flights generated higher mean workload responses and longer latencies. Author

A83-40340

**TRAINING PILOTS FOR TESTING AIRPLANES WITH MODERN FLIGHT CONTROL SYSTEMS**M. PARRAG (Calspan Corp., Buffalo, NY) (Society of Experimental Test Pilots, Mini-Symposium, 13th, San Diego, CA, May 15, 16, 1983) *Cockpit*, vol. 18, Apr.-June 1983, p. 5-20.

The type of testing discussed here has to do with the test pilot's determination of the flying qualities of an aircraft in specified mission-oriented tasks. The new challenges to test pilots posed by 'modern' flight control systems are treated, together with training programs at the USAF and USN test pilot schools designed to help pilots meet these challenges. The design criteria for flight control systems and the MIL SPEC compliance criteria do not allow pilots to adequately predict flying qualities in all situations. Pilot evaluations therefore figure prominently in the data describing flying qualities. This in turn requires that the test pilot provide valid and communicable evaluation data. The special projects using the variable stability and control aircraft at the two test pilot schools aid the new pilot in accomplishing this task. C.R.

A83-40353

**PSYCHIATRIC ILLNESS IN MILITARY AIRCREW**A. W. BLACK *Aviation, Space, and Environmental Medicine* (ISSN 0095-0562), vol. 54, July 1983, p. 595-598.

A discussion is presented of formal psychiatric disorders of a serious nature and problems of a psychological nature leading to symptom formation and diminishing performance as factors in the assessment of military aircrew. It is noted that psychological reactions are closely related in their development to the nature of the task and to the interaction with it of the man. It is emphasized that the appearance of stress-related anxiety symptoms in the man under training together with the appearance of more formal reactions, the anxiety state and the phobic anxiety state are, respectively, the main triggers of decompensation and decrement of performance. The span of symptoms is discussed, focusing on the more likely physical presentation of anxiety in the mature pilot. Also considered is the contribution of fatigue to symptom formation. N.B.

A83-40354

**POINTERS TO DIAGNOSIS OF PSYCHIATRIC ILLNESS IN AIRCREW**P. J. O'CONNOR *Aviation, Space, and Environmental Medicine* (ISSN 0095-0562), vol. 54, July 1983, p. 601, 602.

A discussion is presented of appropriate methods to be used in the psychiatric assessment of aircrew. It is noted that the diagnosis of psychiatric illnesses in aircrew is made by assessing the symptoms complained of by the patient or observed by others. These symptoms should then be assembled into one of the recognized patterns of psychiatric disease and if the match of the symptoms and the textbook pattern is good, a diagnosis of psychiatric ill health is made. It is emphasized that subtle questioning of patients concerning psychiatric symptoms such as smoking and alcohol is required, and that facial expression and demeanor comprise important diagnostic factors. The functional neuroses and psychoses and the organic psychiatric diseases, together with personality and psychosomatic disorders and drug dependence, frequently encountered in psychiatric assessments of aircrew are examined. N.B.

A83-40558

**EMOTIONAL COMPONENTS OF SELF-REPORTS AND INTERPERSONAL JUDGMENTS [EMOTSIONAL'NYE KOMPONENTY SAMOOTCHETOV I MEZHlichNOSTNYKH SUZHDENIY]**A. M. ETKIND *Voprosy Psikhologii* (ISSN 0042-8841), Mar.-Apr. 1983, p. 106-112. In Russian. refs

A83-40559

**REFLECTION AND THE ORGANIZATION OF CREATIVE THINKING AND THE SELF-DEVELOPMENT OF PERSONALITY [REFLEKSIJA I ORGANIZACIJA TVORCHESKOGO MYSHLENIIA I SAMORAZVITII LICHNOSTI]**

I. N. SEMENOV and S. I. STEPANOV Voprosy Psikhologii (ISSN 0042-8841), Mar-Apr. 1983, p. 35-42. In Russian refs

**N83-28871#** Johns Hopkins Univ., Baltimore, Md. Div. of Behavioral Biology

**BEHAVIOR ANALYSIS OF CONFINED MICROsociETIES IN A PROGRAMMED ENVIRONMENT**

H. H. EMURIAN and J. V. BRADY 1 Feb. 1983 55 p refs (Contract N00014-80-C-0467; NR PROJ. 170-910) (AD-A123878; TR-ONR-7) Avail NTIS HC A04/MF A01 CSCL 05A

This report reviews the background, objectives, methodology, and results of a research project devoted to: (1) the development of principles and procedures relevant to the selection and training of sea/space mission personnel; (2) the investigation of preventive monitoring and corrective procedures to enhance sea/space mission performance effectiveness; and (3) the evaluation of countermeasures to the potentially disruptive effects of unfamiliar and stressful environments. Initial research endeavors were directed toward the design and construction of an experimental microsociety environment for continuous residence by small groups of volunteer participants over extended time periods under conditions that provide for performance and recreational opportunities within the context of a biologically and behaviorally supportive setting. Studies were then undertaken to analyze experimentally, conditions that sustain group cohesion and productivity and that prevent social fragmentation and individual performance deterioration, motivational effects produced by the programmed consequences of individual and team performance requirements, and behavioral and biological effects resulting from changes in group size and membership. GRA

**N83-28872#** Army Aeromedical Research Lab., Fort Rucker, Ala. Biomedical Applications Research Div

**PSYCHOLOGICAL MEASUREMENTS DURING THE WEAR OF THE US AIRCREW CHEMICAL DEFENSE ENSEMBLE Final Report, Jul. 1981 - Jul. 1982**

B. E. HAMILTON and L. ZAPATA Feb 1983 54 p refs (Contract DA PROJ. 3E1-62777-A-879) (AD-A125616; USAARL-83-7) Avail NTIS HC A04/MF A01 CSCL 06Q

The psychological (as opposed to physiological) effects of wearing a US aircrew chemical defense ensemble were evaluated using 12 male and 12 female volunteers. Half of the males and half of the females wore chemical defense ensembles while the rest wore standard US flight suits as controls. All subjects were administered tests of cognition (math, logical reasoning, target detection, and reaction time) before and after 6 hours of wear in a controlled environment. In addition, subjects rated their mood before and after wear. It was concluded that wearing the ensemble in an undemanding environment degraded affect (mood and activation levels), slightly decreased accuracy, and substantially decreased reaction times, especially in females. The most serious impact of the ensemble would seem to be a decrease in morale among females. Author (GRA)

**N83-30008#** North Research, Inc., Anchorage, Alaska. Alaskan Aviation Safety Foundation

**THE BUSH PILOT SYNDROME: A CRITICAL INCIDENT ANALYSIS**

M. K. MITCHELL Apr. 1983 13 p refs Avail: NTIS HC A02/MF A01

The National Transportation Safety Board concluded in a 1980 study that the bush pilot syndrome was a major factor contributing to a non-fatal air taxi accident rate four times higher and a fatal rate more than double the rest of the United States. During 1981-1982, the Alaskan Aviation Safety Foundation completed and published a study titled Definition of Alaskan Aviation Training

Requirements. The researchers used Flannigan's critical incident technique. The respondents reported that strict management supervision was the key to controlling the bush pilot syndrome. In addition, observations by the researchers revealed that air taxi operators who hired pilots using a careful screening process, provided thorough training, and remunerated pilots with a rewarding salary and benefit package seemed to have less turnover and fewer accidents. Author

**N83-30009#** Xerox Palo Alto Research Center, Calif. Cognitive and Instructional Sciences Group.

**COMPETITIVE ARGUMENTATION IN COMPUTATIONAL THEORIES AT COGNITION Interim Report**

K. VANLEHN, J. S. BROWN, and J. GREENO Dec. 1982 41 p refs

(Contract N00014-82-C-0067) (AD-A125577; CIS-14; P83-00030) Avail: NTIS HC A03/MF A01 CSCL 05J

Computer science has given psychology a new way of expressing models of cognition that is much more detailed and precise than its predecessors. But unfortunately, the increased detail and precision in stating models has not been accompanied by correspondingly detailed and precise arguments analyzing and supporting them. Consequently, the new, richly detailed models of cognitive science often fail to meet the traditional criteria of scientific theories. This report discusses what kinds of tools are available or can be fashioned that will help cognitive scientists build computational theories of cognition that will meet some widely accepted standards that have so far proved difficult for such theories to meet. The prime tool of this discussion, actually a class of tools, is the competitive argument. Author (GRA)

**N83-30010#** Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.

**A CLINICAL PSYCHOLOGICAL STUDY OF INVERTED VISUAL FIELD BY INVERSING PRISMS**

M. FUJIWARA, T. NAKAO, H. NINOMIYA, and T. IKEDA 10 Feb 1983 22 p refs Transl. into ENGLISH from Kyushu Neuro-Psychiatry (Japan), v. 26, no. 3-4, Dec. 1980 p 384-394 (AD-A126220; FTD-ID(RS)T-1861-82) Avail NTIS HC A02/MF A01 CSCL 06P

The process of adaptation was studied, using inverting prisms. There was no completely upright vision of the external world, was any upright vision subject to the all or none law. Results suggest that perceptive adaptation is based on integration of visual and somatosensory coordination. Author

**N83-30011#** Bernard Baruch Coll., New York. Lab for Psychophysiology

**BRAIN RESPONSES AND INFORMATION PROCESSING 3: HEMISPHERIC ASYMMETRY IN EVENT RELATED POTENTIALS AND PERFORMANCE DURING DISCRIMINATION OF LINE ORIENTATION AND VELOCITY OF MOTION Annual Report, 1 Oct. 1981 - 30 Sep. 1982**

J. I. ANDREASSI and N. M. JUSZCZAK 30 Nov. 1982 73 p refs (Contract F49620-80-C-0013; AF PROJ. 2313) (AD-A125681; AFOSR-83-0062TR; AR-3) Avail: NTIS HC A04/MF A01 CSCL 05J

The research completed over the last 12 months has included studies concerned with evoked brain potentials and performance measures during perceptual discriminations. Experiment 1 examined the event related potential (ERP) during discriminations of line orientation in three visual fields. The main finding concerning discrimination performance confirmed that right hemisphere discriminations (RVF) would be better than left (LVF) but only for males. Another important finding was that, while discrimination task invoked an expected P3 response, significantly larger P3 amplitudes were associated with the line orientation stimulus (i.e., 55 deg line) requiring a YES response. A follow-up study was briefly described in which subjects will be required to say 'YES' to the 50 deg line and 'NO' to the 55 deg line, with the expectation that the P3 amplitude advantage would switch to the 50 deg line.

Experiment 2 concerned the discrimination of motion velocities and the relation of this process to ERPs. Performance data indicated that left hemisphere discriminations (RVF) were superior to right (LVF). A separate analysis of male-female performance indicated that females contributed to this effect more than males. Finally, laterality effects were suggested for the P3 component since right hemisphere derived amplitudes for P3 were larger with the faster velocity. GRA

**N83-30012#** Yale Univ., New Haven, Conn. Dept. of Psychology  
**COMPONENTS OF INDIVIDUAL DIFFERENCES IN HUMAN INTELLIGENCE** Final Report, 1 Oct. 1977 - 30 Sep. 1982  
 R. J. STERNBERG Feb. 1983 102 p refs Submitted for publication  
 (Contract N00014-78-C-0025, RR04200401, NR PROJ. 150-412) (AD-A125633; FR-1-83) Avail NTIS HC A96/MF A01 CSCI 05J

The report is divided into three main sections. The first briefly reviews alternative approaches to understanding the nature of intelligence. The second provides the proposed componential metatheory. The third and main section describes various aspects of the componential theory and tests of this theory. This last section covers inductive and deductive reasoning. The report closes with some conclusions and suggested directions for future research. GRA

**N83-30013#** Maryland Univ., College Park. Lab. for Computer Vision.

**UNDERSTANDING OBJECTS, FEATURES AND BACKGROUNDS** Final Report, 1 May 1980 - 31 Dec. 1982

A ROSENFELD and L S DAVIS Jan 1983 34 p refs  
 (Contract DAAG53-76-C-0138; DARPA ORDER 3206) (AD-A125514) Avail: NTIS HC A03/MF A01 CSCI 05J

Research on Understanding Objects, Features, and Backgrounds, carried out during the period May 1980 December 1982, is summarized under the following headings (a) Object segmentation and recognition, (b) Feature extraction and background analysis, (c) Multi-resolution image analysis, (d) Time-varying imagery analysis. Further details can be found in the 32 technical reports that were issued on the project; a list of these reports, together with their abstracts, is provided. GRA

**N83-30014#** Pennsylvania State Univ., University Park Dept. of Psychology.

**THE MEASUREMENT OF MOTIVATIONAL STYLE: A FORMAT MODIFICATION**

F. J. LANDY and W. S. BECKER Mar. 1983 27 p refs  
 (Contract N00014-81-K-0197, NR PROJ. 170-926) (AD-A125756, REPT-82-2) Avail: NTIS HC A03/MF A01 CSCI 05J

The measurement of motivational style is extended within the framework of Adaptive Motivation Theory. The development of a revised measure using seven paragraph descriptions of motivational style is discussed. Response patterns for the seven styles are examined according to specific variables, such as age, gender, and occupation. The revised format is described as a more sensitive measure of motivational style, than an earlier version.

Author (GRA)

## MAN/SYSTEM TECHNOLOGY AND LIFE SUPPORT

Includes human engineering; biotechnology, and space suits and protective clothing

**A83-37375**

### IMAGE FORMATION IN DIAGNOSTIC X-RAY EQUIPMENT

J. A. DEN BOER Delft, Technische Hogeschool, Doctor in de Technische Wetenschappen Dissertation, 1983, 223 p Research supported by the Philips Medical Systems Organization. refs

The physics of image formation in static radiographic-shadow-image diagnostic X-ray equipment and techniques for its optimization are studied experimentally, taking into account the factor of patient radiation exposure. Physical phenomena investigated include the generation and attenuation of primary radiation, scattered radiation, antiscatter grids, radiation contrast, energy-fluence detection efficiency, modulation transfer, and noise. The window signal-to-noise ratio (WSNR) is found to be an appropriate optimization criterion, and a measure of patient exposure is derived. Optimum values for unsharpness distribution, geometric magnification, focus-to-image-receptor distance, unsharpness level, and X-ray-tube voltage are developed empirically. Their application to the case of cinecardiography demonstrates the usefulness of the WSNR criterion and its limitations with regard to patient-exposure factors, although the methods developed here are considered capable of achieving optimal image quality without significantly increasing the risk to the patient. T K.

**A83-37878**

### CANADIAN FORCES AIR COMBAT HELMET - THE SELECTION

J. C. LAZOWSKI and G. J. Y. LEFEBVRE (Defence and Civil Institute of Environmental Medicine, Downsview, Ontario, Canada) SAFE Journal, vol. 13, Summer 1983, p 4-7. refs

During the last ten years, it was recognized in the air forces in North America that the currently used aircrew helmets are not adequate for high-performance aircraft. The U.S. Navy began first an investigation concerning the options available for new helmets. Recently, the U.S. Air Force Tactical Air Command initiated a program to replace their high performance aircrew helmet. In the Canadian Forces, it was believed that the DH 41-2 helmet was deficient in comfort and with respect of the visual fields. The oxygen mask was found difficult to position and unstable during air combat maneuvering (ACM). An investigation was conducted, and four helmet types were ultimately selected for a comprehensive evaluation. A fifteen week operational trial was conducted involving flights with the air combat aircraft CF-5 and CF-104. The aircrew considered the contact helmets to be more stable than the suspension helmets. G.R.

**A83-37951**

### HUMAN FACTORS APPROACH IN CERTIFICATION FLIGHT TEST

J. J. SPEYER and A. FORT (Airbus Industrie, Blagnac, Haute-Garonne, France) Society of Automotive Engineers, Aerospace Congress and Exposition, Anaheim, CA, Oct. 25-28, 1982 34 p. refs  
 (SAE PAPER 821340)

Aircraft cockpit design and testing approaches based on the functional effectiveness of the man-machine system and the enhancement of crew wellbeing are presented and illustrated using examples from the A-300-FF/A-310 development program. Emphasis is placed on the minimization of physical and mental workload under routine and emergency conditions and the maximization of information-processing and decision-making capability. Workload is discussed in terms of flight-crew certification standards; input load, operator effort, and performance; a flow-chart



model of cockpit information-transfer processes; and objective and subjective evaluation methods. The methodology and results of a simulator and flight testing of workload and performance parameters in the A-300-FF and A-310 (with conventional and electronic flight instrumentation) are described T.K.

#### A83-37977

##### SPACE SHUTTLE ENVIRONMENTAL AND LIFE SUPPORT SYSTEM (ECLSS)

J. E. SWIDER, JR and R. GALLUCCIO (United Technologies Corp., Hamilton Standard Div., Windsor Locks, CT) Society of Automotive Engineers, Aerospace Congress and Exposition, Anaheim, CA, Oct. 25-28, 1982. 11 p. refs (SAE PAPER 821420)

Four of the major environmental control and life support subsystems of the Shuttle Orbiter are described, and the performance of these subsystems through the first three Space Shuttle flights is reviewed. The Atmospheric Revitalization Subsystem (ARS) provides cabin ventilation, temperature control, humidity control, carbon dioxide removal, trace gas contaminant removal, electronics cooling, and heat transport via the water heat transport loop to the Freon Coolant Loop. Its flight performance in regulating cabin temperature, filtering odors, and condensing water is described. The Freon Coolant Loop cools the ARS and equipment located outside the Orbiter cabin. The Flash Evaporator Subsystem provides total Freon loop heat rejection during ascent and entry and supplemental heat rejection during on-orbit operations. Transient conditions which produced anomalies involving this system during two flights are reviewed. The Water Spray Boiler provides a heat sink for the hydraulic system and Auxiliary Power Unit lubricating oil. Freezing anomalies occurred during all three flights, and these are reviewed. C.D.

#### A83-38174

##### DEVICES FOR THE STUDY OF THE BIOELECTRICAL ACTIVITY OF THE MUSCLES OF ATHLETES [USTROISTVA DLIA IZUCHENIIA BIOELEKTRICHESKOI AKTIVNOSTI MYSHTS SPORTSMENOV]

I. N. SALCHENKO, R. F. MAKAR, and E. A. KRAPIVINA (L'vovskii Institut Fizicheskoi Kul'tury, Lvov, Ukrainian SSR; Vsesoiuznyi Nauchno-Issledovatel'skii i Konstruktorskii Institut Radioelektronnoi Meditsinskoi Apparatury, USSR) Teoriia i Praktika Fizicheskoi Kul'tury (ISSN 0040-3601), Feb. 1983, p. 49-51. In Russian.

Three electromyographic devices designed especially for the study of neuro-muscular coordination in athletes are presented. The experimental four-channel electromyograph employs a design making it highly resistant to noise from electromagnetic induction and interelectrode interference. In addition to four simultaneous electromyographs, the device is also capable of recording five additional separate processes, such as time markers and stroboscope pulses. The Start-1 model represents an improved version of the device, with equipment allowing visual or auditory monitoring of the single channel and averaging of the signals. Finally, the electromyophonescope, assembled from the unified components of the Start-1, is compact and light enough to be used in athletic training, the diagnosis of trauma or physical therapy. A.L.W.

#### A83-38179

##### COMPARATIVE STUDY OF VARIOUS NONINVASIVE METHODS OF ARTERIAL PRESSURE RECORDING [SRVINITEL'NOE IZUCHENIE RAZLICHNYKH NEINVAZIVNYKH METODOV REGISTRATSII ARTERIAL'NOGO DAVLENIIA]

G. A. PUTAN, V. M. BOLSHOV, S. A. IUREV, A. M. ROMANOVSKAIA, I. T. PUSHKAR, N. A. KOTOVA, and V. F. CHUDAKOV (Akademii Meditsinskikh Nauk SSSR; Vsesoiuznyi Nauchno-Issledovatel'skii Institut Ispytanii Meditsinskoi Tekhniki, Moscow, USSR) Kardiologia (ISSN 0022-9040), vol. 23, Feb. 1983, p. 65-69. In Russian. refs

Results are presented of a comparative evaluation of four oscillographic methods of noninvasive arterial pressure measurement: two-cuff compression, two-cuff decompression, one-cuff decompression (tachosphigmographic) and the acoustic

method of Korotkov. In the two-cuff methods, a cuff attached to the forearm and maintained at a pressure from 50 to 100 mm Hg is used for the recording of arterial oscillograms with a differential capacitance transducer, while the second cuff, attached to the same arm, is used to induce stepwise pneumatic compression or decompression. The tachosphigmographic method uses oscillations in the tissue at the distal end of a cuff attached to the upper arm as pressure signals, while the Korotkov method is based on measurements made by miniature electrodynamic microphone. Statistical analysis of values of systolic and diastolic pressure obtained by the four methods on 48 subjects reveals mean errors ranging from 2 to 2.7 percent, with no significant differences in mean systolic pressures, but significant differences in diastolic pressures measured by the two-cuff and the Korotkov methods. The differences between the various methods are explained in terms of the different physical processes used to signal changes in vascular section. A.L.W.

#### A83-38181

##### NEW NORMS FOR ELECTROMAGNETIC RADIATION IN THE MICROWAVE RANGE [NOVOE V NORMIROVANII ELEKTROMAGNITNYKH IZLUCHENII MIKROVOLNOVOGO DIAPAZONA]

B. M. SAVIN, K. V. NIKONOVA, E. A. LOBANOVA, M. N. SADCHIKOVA, and E. K. LEBED (Akademii Meditsinskikh Nauk SSSR, USSR) Gigiena Truda i Professional'nye Zabollevaniia, March 1983, p. 1-4. In Russian. refs

A study is presented to determine the relationship of the intensity and length of microwave exposure with the biological effects in order to correct the regulations for the maximum allowable levels of microwave radiation in the USSR. The biological effects of nine different microwave regimes in the 10 cm range with energy flux densities from 0.25-10 mW/sq cm and times of exposure from 6 min-4 hr were studied for rabbits, rats, and mice. The biological effects of the microwave radiation were evaluated by parameters characterizing the condition of the central nervous system, the neuroendocrine system, specific and nonspecific immunity, etc. Results show that the distinct biological effects of microwave radiation depend on the intensity of the radiation, having a nonlinear relationship at high radiation levels (greater than or equal to 4-10 mW/sq cm) and a nearly linear relationship at levels less than 4 mW/sq cm. These results were used to develop a new standard for the maximum allowable levels of microwave exposure in the USSR based on the permissible level of the energy load on the body and the length of the exposure. N.B.

#### A83-38182

##### NEW PRINCIPLES IN THE IMPROVEMENT OF THE NORMALIZATION OF LOCAL VIBRATION [NOVYE PRINTSIPY SOVRSHENSTVOVANIIA NORMIROVANIIA LOKAL'NOI VIBRATSII]

Z. M. BUTKOVSKAIA (Institut Gigieny Truda i Professional'nykh Zabollevanii, Leningrad, USSR) Gigiena Truda i Professional'nye Zabollevaniia, March 1983, p. 4-8. In Russian. refs

Recent studies concerning the improvement of hygienic standards for local vibration in the USSR are reviewed, including studies determining the allowable level of local vibration, the shape of the maximum spectrum curve, and the significance of vibration force characteristics for the effect of the vibration. The results of these studies were utilized to provide an integral evaluation of vibration according to the frequency and the dose of the vibration. The spectral, integral, and dosimetric methods employed in these studies provided the basis for the local vibration standard 2602-80. This standard introduced new allowable values for the vibration rate and vibration acceleration in various work conditions, as well as the weight coefficients for calculating the corrected values of the vibration. The relationship between the allowable values of vibration and the time of exposure, the allowable vibrational load, and the participation of different muscles is examined. N.B.

A83-38201

**A HYGIENIC EVALUATION OF THE CHEMICAL COMPOSITION OF AIR IN LIVING ACCOMMODATIONS [GIGIENICHESKAYA OTSENKA KHIMICHESKOGO SOSTAVA VOZDUKHA V OBITAEMYKH POMESHCHENIIAKH]**M. P. ZAKHARCHENKO and M. T. DMITRIEV. *Voenno-Meditsinskiy Zhurnal* (ISSN 0026-9050), March 1983, p. 42, 43. In Russian.

A discussion is presented concerning the chemical composition of air inside buildings and the health effects of gaseous pollutants such as excess CO<sub>2</sub>, CO, acetone, ozone, and ammonia that are often present in closed environments. It is shown that the chemical composition of air in living accommodations differs significantly from air in the free atmosphere. In situations where a large number of people are gathered in a small area, especially in a closed space, the concentration of various pollutants can often exceed the allowable concentration limit. The primary indicator for determining the condition of the air in living accommodations is the concentration of CO<sub>2</sub>. N.B.

A83-38933

**EVALUATION OF SYSTEM PERFORMANCE IN THE AIR-TRAFFIC-CONTROL WORKPLACE [BEWERTUNG DER SYSTEMLEISTUNG AM LOTSENARBEITSPLATZ]**F. V. SCHICK and J. THOMAS. (Deutsche Forschungs- und Versuchsanstalt fuer Luft- und Raumfahrt, Institut fuer Flugfuehrung, Brunswick, West Germany) (Deutsche Gesellschaft fuer Ortung und Navigation, Sitzung, Brunswick, West Germany, Mar. 1, 1983) *Ortung und Navigation* (ISSN 0474-7550), no. 1, 1983, p. 72-82. In German.

The application of man-machine-system assessment criteria to ATC is considered, with a focus on computer-based ATC-support systems currently being developed. The primary criteria are introduced: system and operator performance (including economy and efficiency of operation), task-oriented workload and operator stress, and operator acceptance of components and procedures. Testing procedures discussed include eye-mark recording of scanning performance and visual workload, voice-stress analysis of verbal communication, the FAA workload-rating scale, the AMRL subjective workload-assessment technique (employing a conjoint-measurement scheme to combine time load, mental-effort load, and psychological-stress load), and physiological indicators of psychological stress. Future work will employ laboratory tests of single components, the use of cockpit and ATC simulators, and field tests at airports. T.K.

A83-39527

**SYNTHESIS OF DYNAMIC ALGORITHMS FOR THE MOTION CONTROL OF MANIPULATOR ROBOTS [SINTEZ DINAMICHESKIKH ALGORITMOV UPRAVLENIIA DVIZHENIEM MANIPULIATSIONNYKH ROBOTOV]**P. D. KRUTKO, N. A. LAKOTA, and E. P. POPOV. (Moskovskoe Vysshee Tekhnicheskoe Vchilishche, Moscow, USSR) *Akademiya Nauk SSSR, Doklady* (ISSN 0002-3264), vol. 270, no. 2, 1983, p. 303-305. In Russian. refs

The problem of designing algorithms for the motion control of manipulator robots on the basis of the complete equations of robot motion is examined. It is shown that the application of microprocessors in the control loop makes it possible to avoid significant simplifications of the mathematical model of the controlled object. In addition, this leads to the possibility of synthesizing control algorithms of arbitrary structure and high complexity on the basis of the complete model of motion with allowance for all the features of the controlled process. This synthesis is considered in the framework of inverse dynamic problems. B.J.

A83-40306\*# Jet Propulsion Lab., California Inst. of Tech., Pasadena.

**BRINGING AI UP TO THE SPACE CHALLENGE**E. HEER (California Institute of Technology, Jet Propulsion Laboratory, Pasadena, CA) *Astronautics and Aeronautics* (ISSN 0004-6213), vol. 21, July-Aug 1983, p. 42-47. refs

The state of the art in automated systems for working in environments hostile to humans is assessed, together with the technological advancements necessary to meet NASA goals. Since completely automated operations are not possible with the current level of artificial intelligence (AI), the operator must have access to remote television access and interactive computerized controls. A proximal system exists when the teleoperated mechanism is close enough so that negligible time passes between operator and servocontrolled activation and feedback. An additional constraint is the complexity of the signal. Further development areas have been identified as limiting the necessary communication, compensating for technical limitations of communication with remote systems, such as bandwidth, error rate, and equipment response time, and to build-in fault tolerance, self-diagnosis, and self-maintenance capabilities. An AI expert system is being developed at JPL to provide an expert knowledge base and a decision-making capability. It is suggested that only thorough questioning of mission and spacecraft experts, as well as searching the large volume of project documentations, will provide the necessary data for establishing an expert data base for AI implementation. M.S.K.

A83-40359

**BASILAR SKULL FRACTURE IN U.S. ARMY AIRCRAFT ACCIDENTS**D. F. SHANAHAN (U.S. Army, Aeromedical Research Laboratory, Fort Rucker, AL) *Aviation, Space, and Environmental Medicine* (ISSN 0095-0562), vol. 54, July 1983, p. 628-631. refs

Of the 222 flight helmets retrieved from Army aircraft accidents during 1971-79 under the Aviation Life Support Equipment Retrieval Program, 175 were SPH-4 helmets that were analyzed for physical damage and for the relationship of damage to injury sustained by the wearer. This analysis showed that lateral impacts resulted in a significantly higher rate of serious injury (AIS equal to, or greater than, 4) than impacts to other regions (68 percent versus 46 percent, p less than 0.001). Lateral impacts yielded a higher rate of basilar skull fracture than impacts to other areas of the helmet (46 percent versus 18 percent, p less than 0.001). It is concluded that lack of energy-absorbing material in the lateral portions of the helmet causes the high rate of basilar skull fracture and the increased prevalence of severe injury associated with lateral impacts. The incorporation of an energy-absorbing earcup design is recommended to reduce the high rate of severe injuries associated with lateral impacts. Author

A83-40363

**ACTIVE DIVER THERMAL PROTECTION REQUIREMENTS FOR COLD WATER DIVING**M. W. LIPPITT and M. L. NUCKOLS (U.S. Navy, Naval Coastal Systems Center, Panama City, FL) *Aviation, Space, and Environmental Medicine* (ISSN 0095-0562), vol. 54, July 1983, p. 644-648. refs

An analysis of the supplemental heating requirements for military divers, both surface-tended and free-swimming, is presented. Specific categories of diver heat loss, including respiratory losses and suit convective losses, are characterized over a range of water temperatures, depths, and breathing gas mixtures. The need for a 1-kW diver heater is identified to accommodate deep dives where the limitation of a surface-supplied hot water source and a long hot water umbilical pose an unacceptable burden. A 0.5-kW heater is shown to be satisfactory to extend the performance of existing closed circuit-breathing apparatuses for shallow water operations in water temperatures as low as 40 deg F. Substantial benefits in heat savings are shown through the use of passive regenerative breath heaters and alternative suit inflation gases for drysuit use. Author

A83-40560

**DIALOG WITH A COMPUTER - PSYCHOLOGICAL ASPECTS [DIALOG S EVM - PSIKHOLOGICHESKIE ASPEKTY]**IU D. BABAEVA, A. E. VOISKUNSKII, V. V. KOBELEV, and O. K. TIKHOMIROV. *Voprosy Psikhologii* (ISSN 0042-8841), Mar.-Apr. 1983, p. 25-34. In Russian. refs

Several psychological parameters are examined which characterize dialog between a human and an interactive computer, including the active initiation of the dialog by the computer, the computer's understanding of the instructions given by the human, the computer's protection from inadequate information, and the personification of the computer. These problems are illustrated by the practical experience obtained using the interactive dialog-type computer system 'Dzheen'. It is concluded that dialog systems in natural languages using interactive computers will provide new possibilities for psychological investigations, including automated questionnaires, automated statistical data about the work of the computer user, and the automated initial analysis of results. N.B.

A83-40576

**STEREOTAXIC COMPUTER TOMOGRAPHY [STEREOTAKSICHESKAIYA KOMP'UTERNAIA TOMOGRAFIYA]**A. G. MELIKIAN, E. B. SOKOLOVA, S. M. IGNATOV, and S. A. LOBANOV. *Akademii Meditsinskikh Nauk SSSR; Nauchno-Proizvodstvennoe Ob'edinenie Kvant, Moscow, USSR*) *Voprosy Neirokhirurgii* (ISSN 0042-8817), Mar.-Apr. 1983, p. 11-16. In Russian. refs

Methods for the use of computer tomography (CT) in stereotaxic calculations are discussed. A method for stereotaxic CT is developed which can be used for calculating targets according to CT. In combination with a high resolution (ND = 8000) CT scanner, this method can be used to achieve targets with an average error of no larger than 1 mm in all directions. The calculations are obtained by using computer tomography service programs. This method is simple and reliable, and exposes the patient to relatively small amounts of radiation. Results are presented for the use of this method in stereotaxic biopsies for patients with deeply located brain tumors. This method is recommended for neurosurgical applications, primarily in the diagnosis and treatment of patients with brain tumors. N.B.

N83-28873 Wisconsin Univ., Madison

**DEVELOPMENT OF AN AUTOMATED GUIDANCE AND DYNAMIC MEASUREMENT SYSTEM FOR COORDINATE MEASURING MACHINES AND ROBOTIC DEVICES Ph.D. Thesis**

K. C. LAU 1981 246 p

Avail. Univ. Microfilms Order No. DA8220881

Recent advances in manufacturing technologies have created the need for a modern and sophisticated system to inspect the geometries of various parts produced for both quality and process control. The development of computer-controlled universal coordinate measuring systems (CMS) is a solution to this demand. This dissertation deals with the development of an automatic tactile sensing guidance and dynamic measurement system for coordinating measuring machines and robotic devices. The key to the success of the guidance and dynamic measurement schemes is the ability of the schemes to evaluate the frictional effect between the probe and the part during tracing. Once computed, the frictional effect is used to compensate for the probe measurement to obtain the actual point of contact between the probe and the part. An experimental system is developed to implement the 2 dimensional tracing and measurement theories. Dissert. Abstr.

N83-28874 Defence Research Information Centre, Orpington (England)

**THE EFFECTS OF HEARING PROTECTORS ON THE PERCEPTION OF ACOUSTIC SIGNALS**H. LAZARUS. Feb. 1983 23 p refs. Transl. into ENGLISH of *Zentr. fuer Arbeitsmed. (West Germany)*, v. 30, no. 6, 1980 p. 204-212

(DRIC-T-6786; BR87062) Avail. Issuing Activity

Auditory signal recognition in high noise environments using hearing protectors is studied. The effects of noise spectra and protector frequency response are discussed. The greater the change in sound attenuation per octave of a hearing protector, the higher the loss of audibility through this hearing protector. It is shown that the audibility of signals may improve. The selection of hearing protectors is discussed, concluding that different types should be made available so that each subject can select the type which he subjectively finds least disturbing. Author (ESA)

N83-28875# California Univ., Livermore. Lawrence Livermore Lab.

**ENVIRONMENTAL TESTING OF ESCAPE BREATHING APPARATUS**

J. W. STENGEL 3 May 1982 9 p refs. Presented at the 12th Intersoc. Conf. on Environ. Systems, San Diego, Calif., 19 Aug 1982

(Contract W-7405-ENG-48)

(DE82-014139, UCRL-87580, CONF-820813-1) Avail. NTIS HC A02/MF A01

A new generation of 60 minute self contained breathing apparatus was introduced into the underground coal mining industry for use as respiratory protection during fires and mine disasters. Little field experience existed from which to predict the survivability of this new life support equipment. A series of environmental tests was proposed consisting of exposure to heat, cold, shock, and vibration. Treated and untreated apparatus were evaluated and compared by use on human subjects and a mechanical breathing simulator. Results are reported. After field data were collected, information may be correlated with environmental testing and used as a predictor of survivability. DOE

N83-28876# General Electric Co., St. Petersburg, Fla. Neutron Devices Dept.

**CLEAN-ROOM ROBOT IMPLEMENTATION**

J. L. COMEAU 14 Jul 1982 31 p

(Contract DE-AC04-76DP-00656)

(DE82-016309, GEPP-TIS-663) Avail. NTIS HC A03/MF A01

A robot was incorporated in a clean room operation in which vacuum tube parts are cleaned just prior to final assembly with a 60 lb/sq. in. blast of argon gas. The robot is programmed to pick up the parts, manipulate/rotate them as necessary in the jet pattern and deposit them in a tray precleaned by the robot. A carefully studied implementation plan was followed in the procurement, installation, modification and programming of the robot facility. An unusual configuration of one tube part required a unique gripper design. A study indicated that the tube parts processed by the robot are 12% cleaner than those manually cleaned by an experienced operator. DOE

N83-30015 National Physical Lab., Teddington (England) Div. of Materials Applications

**AN ENGINEERING ASSESSMENT OF HEAD TOLERANCE CRITERIA**

F. J. LOCKETT Apr. 1983 17 p refs

(Contract TRRL-90/1297)

(NPL-DMA(A)63; ISSN-0143-7313) Avail. Issuing Activity

Criteria for the specification of human tolerance to conditions which produce brain damage are assessed. Evaluation of their suitability for use in designing protective systems indicates that they are appropriate and that defects are of little practical importance. Biomechanical analysis shows that the Wayne State curve and the Gadd, severity, and head injury criteria are sound. The role of criteria based on jerk is identified, and it is demonstrated

that there is a tractable route to a criterion for tolerance to angular acceleration  
Author (ESA)

**N83-30016\*#** National Aeronautics and Space Administration  
Ames Research Center, Moffett Field, Calif.  
**CONTROLLED ECOLOGICAL LIFE SUPPORT SYSTEM. FIRST PRINCIPAL INVESTIGATORS MEETING**

B. MOORE, III, ed. (New Hampshire Univ., Durham), R. A. WHARTON, JR., ed. (New Hampshire Univ., Durham), and R. D. MACELROY, ed. Dec 1982 90 p refs Meeting held in Durham, N.H., 3-6 May 1981  
(Contract NCC2-27)

(NASA-CP-2247; A-9055, NAS 1 55 2247; CELSS-19) Avail:  
NTIS HC A05/MF A01 CSCL 06C

Control problems in autonomous life support systems, CELSS candidate species, maximum grain yield, plant growth, waste management, air pollution, and mineral separation are discussed.

**N83-30017\*#** National Aeronautics and Space Administration.  
Ames Research Center, Moffett Field, Calif.

**CURRENT CONCEPTS OF THE CELSS PROGRAM**

R. D. MACELROY *In its* Controlled Ecol. Life Support System p 1-4 Dec. 1982

Avail. NTIS HC A05/MF A01 CSCL 06K

The intent of the National Aeronautics and Space Administration in supporting the Controlled Environment Life Support System (CELSS) program is to establish the technological basis for the development of life support systems that are relatively independent of resupply. Such systems, it is anticipated, will be needed in the future to support manned space flight involving long duration missions and large numbers of people. The establishment of a resupply-independent life support system requires that all or most of the material in such a system be retained and recycled. In fact, leakage of gases into space, or into atmospheres of significantly lower pressure than that found inside of the system, is inevitable. Technical advances in sealing capabilities may reduce losses in the future, but no seals will ever be perfectly impervious to common atmospheric gases. Thus, a CELSS is envisioned to be a recycling system that will need to be resupplied with gases from time to time  
Author

**N83-30018\*#** National Aeronautics and Space Administration.  
Ames Research Center, Moffett Field, Calif.

**THE CELSS PROGRAM: AN OVERVIEW OF ITS STRUCTURE AND USE OF COMPUTER MODELING**

M. M. AVERNER and R. D. MACELROY *In its* Controlled Ecol. Life Support System p 5-8 Dec 1982

Avail. NTIS HC A05/MF A01 CSCL 06K

The study of the behavior of conceptualized, closed, regenerative life support systems by computer modeling is proposed.  
Author

**N83-30019\*#** California Univ., Berkeley. Dept. of Mechanical Engineering

**CELSS SYSTEM CONTROL OVERVIEW**

D. M. AUSLANDER *In* NASA. Ames Research Center Controlled Ecol. Life Support System p 9-11 Dec. 1982

Avail. NTIS HC A05/MF A01 CSCL 06K

A CELSS presents unique control problems at all levels. The question of how much control is necessary (as opposed to just useful) is addressed. On the largest scale, that of overall system control, this reduces to the question, "Is a CELSS that has been designed for steady-state balance in all its flows, with the addition of reasonable amounts of buffering, stable in the face of perturbations from that operating point?" That is, if some inadvertent perturbation occurs (temporary shutdown of some component, for example), will the system return to its original operating point without the imposition of a global control scheme? If the system is stable in that sense, any kind of large-scale control scheme will be useful for optimizing the system, but will not be necessary.  
Author

**N83-30020\*#** National Aeronautics and Space Administration.  
Ames Research Center, Moffett Field, Calif.

**CONTROL PROBLEMS IN AUTONOMOUS LIFE SUPPORT SYSTEMS**

S. COLOMBANO *In its* Controlled Ecol. Life Support System p 12-17 Dec 1982 refs Sponsored in part by NAS-NRC

Avail. NTIS HC A05/MF A01 CSCL 06K

The problem of constructing life support systems which require little or no input of matter (food and gases) for long, or even indefinite, periods of time is addressed. Natural control in ecosystems, a control theory for ecosystems, and an approach to the design of an ALSS are addressed  
Author

**N83-30028\*#** Massachusetts Inst. of Tech., Cambridge Dept. of Nutrition and Food Science

**FOOD SYSTEMS FOR PCELSS**

M. KAREL *In* NASA. Ames Research Center Controlled Ecol. Life Support System p 34-37 Dec. 1982

Avail. NTIS HC A05/MF A01 CSCL 06H

Developing acceptable and reliable engineered foods, adapting present technology and food science to expected space conditions, and food conversion operations are summarized  
Author

**N83-30029\*#** Jet Propulsion Lab., California Inst. of Tech., Pasadena.

**GENERIC WASTE MANAGEMENT REQUIREMENTS FOR A CONTROLLED ECOLOGICAL LIFE SUPPORT SYSTEM (CELSS)**

T. HOSHIZAKI and B. D. HANSEN, III *In* NASA. Ames Research Center Controlled Ecol. Life Support System p 38-50 Dec 1982 refs

Avail. NTIS HC A05/MF A01 CSCL 06K

Sources of waste, general requirements for plant growth, plant culturing systems, output requirements to match candidate plants, and integration of subsystems are addressed.  
Author

**N83-30030\*#** National Aeronautics and Space Administration.  
Ames Research Center, Moffett Field, Calif.

**WET OXIDATION AS A WASTE TREATMENT METHOD IN CLOSED SYSTEMS**

B. L. ONISKO and T. WYDEVEN *In its* Controlled Ecol. Life Support System p 51-53 Dec. 1982 refs

Avail. NTIS HC A05/MF A01 CSCL 06K

The chemistry of the wet oxidation process was investigated in relation to production of plant nutrients from plant and human waste materials as required for a closed life support system. Hydroponically grown lettuce plants were used as a model plant waste, and oxygen gas was used as an oxidant. Organic nitrogen content was decreased 88-100%, depending on feed material. Production of ammonia and nitrogen gas accounted for all of the observed decrease in organic nitrogen content. No nitrous oxide (N<sub>2</sub>O) was detected. The implications of these results for closed life support systems are discussed  
Author

**N83-30031\*#** Georgia Inst. of Tech., Atlanta. School of Nuclear Engineering.

**SOME ISSUES IN COMPARABILITY OF RESULTS AND ANALYTICAL METHODOLOGY IN CELSS WASTE PROCESSING RESEARCH**

J. CARDEN *In* NASA. Ames Research Center Controlled Ecol. Life Support System p 54-56 Dec 1982 refs

Avail. NTIS HC A05/MF A01 CSCL 06K

Standard waste materials including human wastes, food preparation and processing waste and hydroponically grown wheat were provided to CELSS researchers.  
Author

## 54 MAN/SYSTEM TECHNOLOGY AND LIFE SUPPORT

**N83-30034\*#** Rockwell International Corp., Downey, Calif. Space Transportation and Systems Group  
**TELEOPERATOR MANEUVERING SYSTEM (TMS) BENEFITS ASSESSMENT STUDY. VOLUME 1: EXECUTIVE SUMMARY Final Report**

Apr. 1983 42 p 2 Vol.

(Contract NAS8-34888)

(NASA-CR-170795; NAS 1.26 170795) Avail: NTIS HC A03/MF A01 CSCL 05H

Teleoperator Maneuvering System (TMS) versus integral spacecraft propulsion, spacecraft maintenance, cost benefits, launch prices, integral propulsion length penalties, remote maintenance versus EVA, potential weight reduction benefits, basing mode, mission models and payload requirements, and program profitability are discussed Author

**N83-30035\*#** Rockwell International Corp., Downey, Calif. Space Transportation and Systems Group.

**TELEOPERATOR MANEUVERING SYSTEM BENEFITS ASSESSMENT, VOLUME 2 Final Report**

Apr. 1983 262 p 2 Vol

(Contract NAS8-34888)

(NASA-CR-170795; NAS 1.26.170796) Avail: NTIS HC A12/MF A01 CSCL 05H

Mission models and payload requirements, systems integration requirements, costing analysis, and Teleoperator Maneuvering System benefits analysis are presented. Author

**N83-30036#** Bolt, Beranek, and Newman, Inc., Cambridge, Mass

**DISPLAY-CONTROL COMPATIBILITY IN 3-D DISPLAYS. 2: EFFECTS OF CUE SYMMETRY**

A W. F. HUGGINS and D. J. GETTY 15 Nov. 1982 67 p refs

(Contract N00014-80-C-0750; RR0420901)

(AD-A125806; BBN-5101) Avail: NTIS HC A04/MF A01 CSCL 09B

This report describes the second set of four experiments in a series of studies on display-control compatibility issues in a true volumetric display called SpaceGraph. As in the initial set of experiments, we measured the speed and accuracy of simple control decisions when the displayed object was presented in orientations rotated away from congruence with the control orientation. Reaction times were measured for identifying the marked face of a static cube, presented with SpaceGraph, as a function of how much the cube image was rotated away from congruence with fixed physical cube on which the observer responded, using orientation cues with various symmetries GRA

**N83-30037#** Battelle Columbus Labs., Ohio Digital Systems and Technology Sect.

**GUIDANCE AND ACTUATION TECHNIQUES FOR AN ADAPTIVELY CONTROLLED VEHICLE Final Report, 20 Jan. 1982 - 21 Mar. 1983**

M. R. PATTERSON, J. J. REIDY, and B. J. BROWNSTEIN 21 Mar 1983 128 p refs

(Contract MDA903-82-C-0149, DARPA ORDER 4385)

(AD-A126296) Avail: NTIS HC A07/MF A01 CSCL 13F

This technical report describes the work done to support the overall DARPA Adaptive Suspension Vehicle program. The project consisted of two major tasks: vehicle guidance and actuation techniques. The objective of the first task was to derive a method for enabling an adaptive-suspension vehicle to traverse rough terrain. The second task was concerned with actuation techniques for the legs on the vehicle, specifically an in-depth analysis, design, and demonstration of the vehicle foot-lift hydraulic circuit. This report describes the development of the vehicle guidance algorithms and the foot-lift hydraulic circuit design. GRA

**N83-30038#** Defence and Civil Inst. of Environmental Medicine, Downsview (Ontario).

**EVALUATION OF HIGH PERFORMANCE AIRCREW HELMETS AND OXYGEN MASKS**

J. C. LAZOWSKI and R. D. MICHAS Oct. 1982 50 p refs

(AD-A126036; DCIEM-82-R-54) Avail: NTIS HC A03/MF A01 CSCL 06K

The requirement for a new oxygen mask and helmet for use by Canadian Forces (CF) aircrew in the air combat maneuvering (ACM) role was indicated in 1978. Initial studies were conducted to identify shortcomings of the current assembly and to allow aircrew to rank design characteristics. Four helmet and four oxygen mask types were ultimately selected for comprehensive evaluation. A flight trial involving 48 aircrew flying primarily CF-5 and CF-104 aircraft was conducted at CFB Cold Lake in order to determine aircrew preferences for overall and specific designs, including the preference for single or dual visor. Maintenance implications of all test equipment were also evaluated. Equipment properties were determined in laboratory studies conducted primarily at DCIEM. It is concluded that the best assembly for aircrew of CF ACM aircraft is an extended PRK 37P helmet shell with thermal plastic liner, integrated chin/nape strap, cutaway PRU 36P (dual) visor and modified type W oxygen mask. However, deficiencies related to the visor weight, center of gravity and profile should be resolved.

Author (GRA)

**N83-30039#** Naval Ocean Systems Center, San Diego, Calif. Ocean Systems Div

**VOICE CONTROL OF AN UNMANNED SUBMERSIBLE**

R. NISHIJO 13 Jan. 1983 20 p

(AD-A125523; NOSC/TD-560) Avail: NTIS HC A02/MF A01 CSCL 13J

The advantages of voice control of the movement of an unmanned, remotely controlled submersible and the feasibility of such a system are discussed. Application of voice control to the Fiber Optic Controlled Underwater Stereo (FOCUS) vehicle is described and an associated computer program listing presented.

Author (GRA)

**N83-30040#** Air Force Occupational and Environmental Health Lab., Brooks AFB, Tex. Industrial Hygiene Branch.

**PROPELLANT HANDLER'S ENSEMBLE IN-SUIT NOISE MEASUREMENTS Final Report**

C. M. JONES Jan. 1983 17 p

(AD-A125507; OEHL-83-072EH003ANA) Avail: NTIS HC A02/MF A01 CSCL 06Q

The USAF OEHL requested by HQ Space Division (AFSC) to measure octaveband noise levels inside the new propellant handler's ensemble (PHE) for use by the Space Shuttle Activation Task Force (SATAF) at Vandenberg AFB CA. The noise levels were necessary to determine if the PHE meets the requirements of paragraph 3.1.3.6.3 of the suit specification (79K20409) and to assess the potential for possible interferences with either internal or external voice transmissions. The PHE met the specification levels in several but not all operating categories. Speech interference levels were also dependent on the operating category Author (GRA)

## PLANETARY BIOLOGY

Includes exobiology; and extraterrestrial life

**A83-38590****2.8-3.6-MICRON SPECTRA OF MICRO-ORGANISMS WITH VARYING H<sub>2</sub>O ICE-CONTENT**

F. HOYLE, N. C. WICKRAMASINGHE, and N. L. JABIR (University College, Cardiff, Wales) *Astrophysics and Space Science* (ISSN 0004-640X), vol. 92, no. 2, May 1983, p. 439-443. refs

The extinction curves of bacterial grains on which microns variable mass fractions of water-ice are condensed are calculated. Because the ice band at 3.07 microns is stronger by a factor of about thirty than the OH and CH stretching bands in organic materials, even a small mass fraction of ice condensed inside or on the surface of the particles modifies and tends to obscure the characteristic biological signature at about 3.4 microns. Author

**A83-38891****AMP SYNTHESIS IN AQUEOUS SOLUTION OF ADENOSINE AND PHOSPHORUS PENTOXIDE**

Y. YAMAGATA, H. KOJIMA, K. EJIRI, and K. INOMATA (Kanazawa University, Kanazawa, Japan) *Origins of Life* (ISSN 0302-1688), vol. 12, Dec. 1982, p. 333-337. refs

The role in chemical evolution of the possible formation of a P<sub>4</sub>O<sub>10</sub> molecule in magma, the stability of the molecule in hydrous volcanic gas at high temperatures, and a possible prebiotic phosphate cycle is examined. The utility of phosphorus pentoxide as a phosphorylating agent was demonstrated in experiments in which aqueous solutions of adenosine (0.02 M) and phosphorus pentoxide (0.2 M) were incubated at 37 °C for five months, while the pH of the solutions was adjusted regularly to fixed values (9.0, 10.5, 11.5, and 12.5). An analysis of the resulting products showed the formation of 2'-AMP, 3'-AMP, 5'-AMP, cyclic (2'-3')-AMP, and cyclic (3'-5')-AMP. The main components of the product were found to be 2' and 3'-AMP, although cyclic (2'-3')-AMP was the main component in the early period of the incubation at pH 9.0. It was found that the yields (the conversion rate of adenosine to AMPs) increased almost linearly with the incubation time for 5 months at pH 9.0. The final yields were about 3 percent (pH 9.0), 32 percent (pH 10.5), 43 percent (pH 11.5), and 35 percent (pH 12.5). N.B.

**A83-38892****FORMATION OF AMINO ACIDS FROM REACTOR-IRRADIATED AMMONIUM ACETATE**

M. AKABOSHI, K. KAWAI, H. MAKI, K. KAWAMOTO (Kyoto University, Osaka, Japan), and Y. HONDA (Kobe Medical Technique School, Kobe, Japan) *Origins of Life* (ISSN 0302-1688), vol. 12, Dec. 1982, p. 339-345. refs

Ammonium acetate was irradiated in a reactor under various conditions in order to determine the effect of doses on product formation and the chemical behavior of C-14 produced by the nuclear reaction N-14(n, p)C-14 in various biologically interesting molecules. It was found that several amino acids, glycine (alanine, beta-alanine, and GABA, and perhaps aspartic acid, serine and valine) were formed in aqueous solutions of ammonium acetate during prolonged irradiation. C-14 radioactivities were also found to be distributed in these amino acids, although no special relationship between C-14 radioactivity and these amino acids was observed. N.B.

**A83-38897****ASYMMETRICAL RADICAL FORMATION IN D- AND L-ALANINES IRRADIATED WITH TRITIUM-BETA-RAYS**

M. AKABOSHI, M. NODA, K. KAWAI, H. MAKI, and K. KAWAMOTO (Kyoto University, Osaka, Japan) *Origins of Life* (ISSN 0302-1688), vol. 12, Dec. 1982, p. 395-399. refs

**A83-38900\*** Universidad Nacional Autonoma de Mexico, Villa Obregon.

**ROLE OF SUCCINIC ACID IN CHEMICAL EVOLUTION**

A. NEGRON-MENDOZA (Universidad Nacional Autonoma de Mexico, Villa Obregon, Mexico) and C. PONNAMPERUMA (Maryland, University, College Park, MD) *Origins of Life* (ISSN 0302-1688), vol. 12, Dec. 1982, p. 427-431. Research supported by the National Council of Science and Technology of Mexico. refs

(Contract NGR-21-002-317)

Succinic acid is converted into other carboxylic acids by ionizing radiation. The results obtained have been correlated with the ready formation of this compound in prebiotic experiments. Its role in biological systems may be related to its prebiotic occurrence.

Author

**N83-28020# Joint Publications Research Service, Arlington, Va. ACADEMICIAN TROITSKIY ON SEARCH FOR EXTRA-TERRESTRIAL INTELLIGENCE**

*In its* USSR Rept.: Space, No. 21 (JPRS-83430) p. 74-77. 9 May 1983. refs. Transl. into ENGLISH from Leningr. Pravda (Leningrad), 2 Nov. 1982, p. 3.

Avail: NTIS HC A07

The topic of extraterrestrial life was discussed with emphasis on the following areas: lack of signals from alien space civilizations, need of larger receiving antennas, their technological development, and the speed of signal dissemination. B.G.

**N83-30041\*#** National Aeronautics and Space Administration, Washington, D. C.

**PUBLICATIONS OF THE EXOBIOLGY PROGRAM FOR 1982. A SPECIAL BIBLIOGRAPHY**

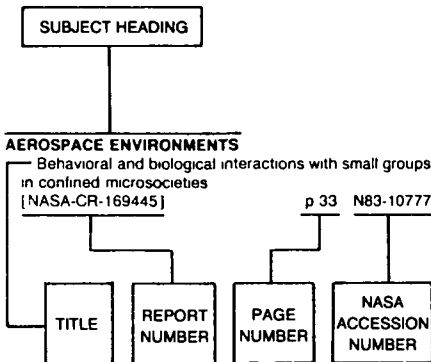
L. G. PLEASANT, comp. and D. L. DEVINCENZI, comp. Jul. 1983. 40 p. Prepared in cooperation with George Washington Univ., Washington, D.C.

(NASA-TM-85837; NAS 1.15.85837) Avail: NTIS HC A03/MF A01 CSCL 06C

Chemical evolution, organic geochemistry, origin and evaluation of life, planetary environments, life in the universe, search for extraterrestrial intelligence, and planetary protection are discussed. Author



## Typical Subject Index Listing



The subject heading is a key to the subject content of the document. The title is used to provide a description of the subject matter. When the title is insufficiently descriptive of the document content, the title extension is added, separated from the title by three hyphens. The (NASA or AIAA) accession number and the page number are included in each entry to assist the user in locating the abstract in the abstract section. If applicable, a report number is also included as an aid in identifying the document. Under any one subject heading, the accession numbers are arranged in sequence with the AIAA accession numbers appearing first.

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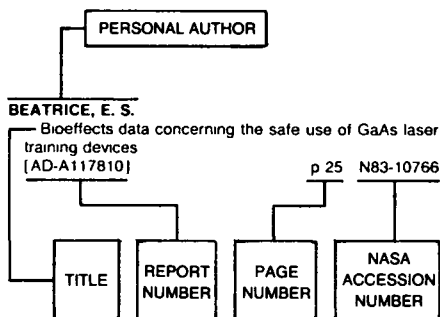
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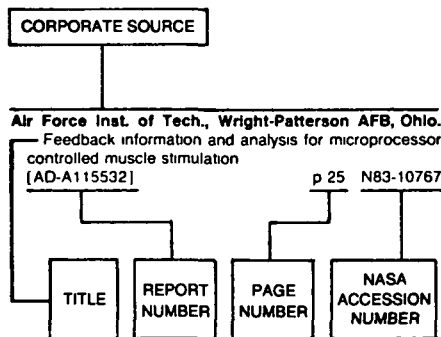


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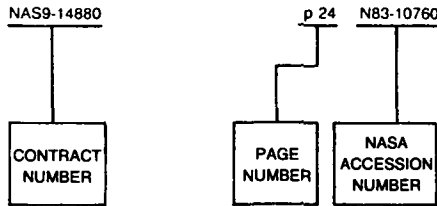
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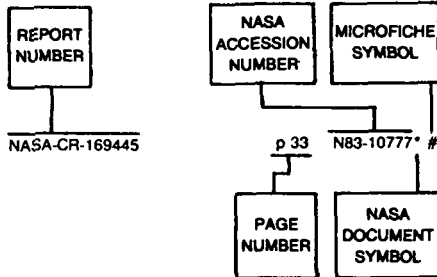
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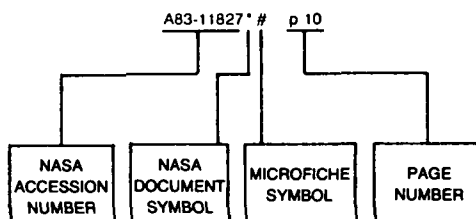
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